FOOD MANUFACTURE

Incorporating Food Industries Weekly

NARD HILL, LIMITED, STRATFORD HOUSE, 9 EDEN STREET, LONDON, N.W.1 SEPTEMBER 1, 1956

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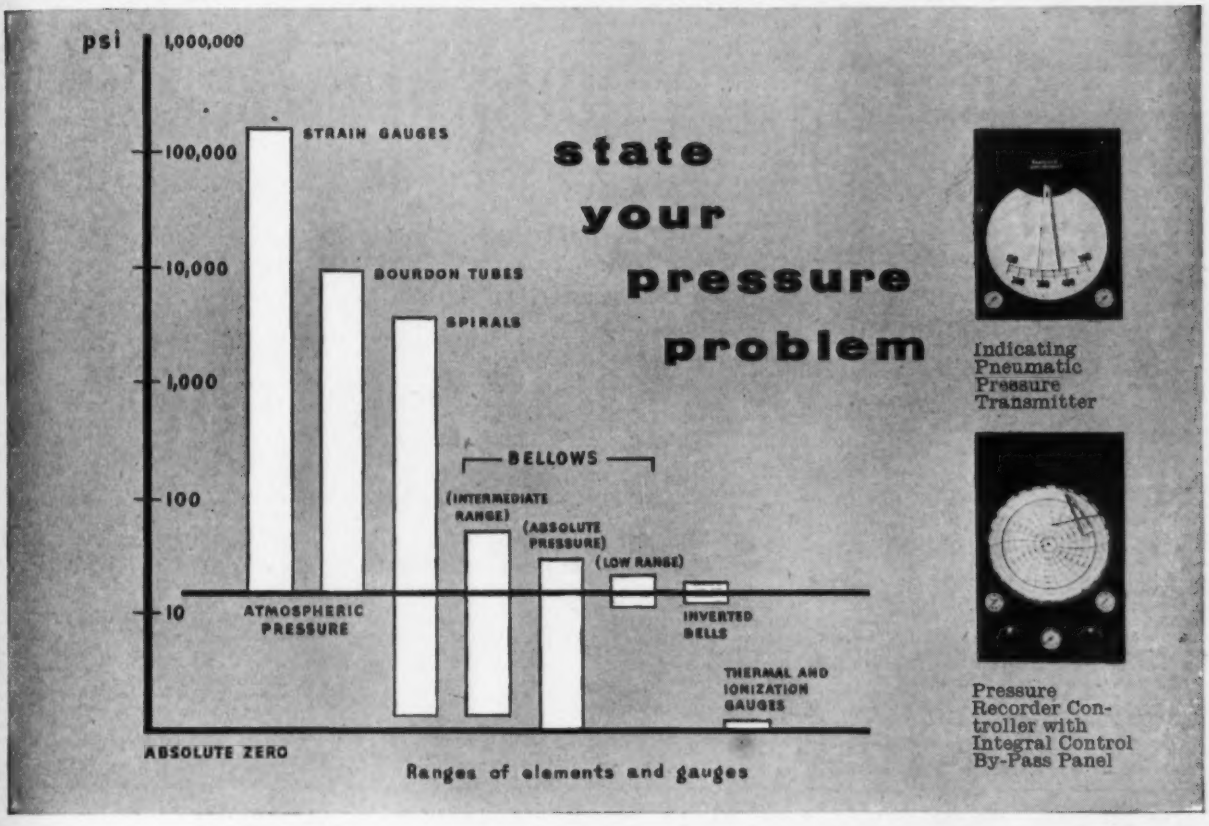

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BROWN INSTRUMENTS
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Index to ADVERTISERS

	Page
Abix (Metal Industries), Ltd.	Aug.
Acalor Ltd.	June
Advita Ltd.	xcvi
Agricultural & Chemical Products, Ltd.	cxxv
Air Control Installations, Ltd.	xliii
Airguard, Ltd.	cix
Albro Fillers & Engg. Co., Ltd.	Aug.
Alexandra Separator Co., Ltd.	Aug.
Alfa-Laval Co., Ltd.	cxiii
Alite Machines, Ltd.	Aug.
Allen, Stafford, & Sons, Ltd.	lii
Allspeeds, Ltd.	xl
Angel Warehouses Co., Ltd.	cxxv
Anglo-Dal Ltd.	lix
Anhydro, A/S	ciii
Ascot Water Heaters Ltd.	xxxiv
Associated Metal Works, Ltd.	Aug.
Baldwin Instrument Co., Ltd.	Aug.
Barron, W. S., & Sons, Ltd.	Aug.
Bayer Products, Ltd.	civ
Bear Honey Co., Ltd.	cxviii
Beddington Nut & Produce Co., Ltd.	cxxii
Begg, Cousland & Co. Ltd.	Aug.
Bellingham & Stanley, Ltd.	Aug.
Benjamin Electric, Ltd.	June
Bennet Sons & Shears, Ltd.	Aug.
Betts & Co., Ltd.	June
Bliss, E. W., (England), Ltd.	xxxvii
Boehm, Fredk., Ltd.	xxvii
Bowater-Eburite, Ltd.	l, li, xciv
Braby, Fredk., & Co., Ltd.	xxxviii
Bramigk & Co., Ltd.	lxx
Bramwell, S., & Co., Ltd.	xcv
Brierley, Wm., Collier & Hartley, Ltd.	cxiv
British American Product Co., Ltd.	cxx
British Belting & Asbestos, Ltd.	lxiv
British Brehmer, Ltd.	cxxvi
British Ceca Co., Ltd., The	cxxvi
British Celanese, Ltd.	July
British Cellophane, Ltd.	xxiii
British Electrical Development Association	xxxii
British Hydrological Corporation	lxii
British Rayophane, Ltd.	Aug.
British Road Services, Ltd.	xiv
British Sidac Ltd.	Aug.
British Thomson-Houston Co., (Rugby)	Aug.
British Visqueen, Ltd.	July
British Wedge Wire Co., Ltd.	July
Broadbent, Thomas, & Sons, Ltd.	xviii
Brook Motors, Ltd.	xxx
Brown & Forth, Ltd.	cxxii
Brown & Polson, Ltd.	July
Bryan, Wm., Ltd.	c
Bush, W. J., & Co., Ltd.	Cover i
Butterfield, W. P., Ltd.	Aug.
Caleb Duckworth, Ltd.	iv
Calfos, Ltd.	cxi
Cambitzi, G., & Co., Ltd.	July
Canning Town Glass Works, Ltd.	cxx
Cashmore, John Ltd.	cxxii
Chamberlain & Willows	July
Clarke-Built, Ltd.	xvii
Clark, George, & Co., Ltd.	June
Clark, T. & C., Ltd.	Aug.
Coates Bros. Inks, Ltd.	xxxiii
Cohen, George, Sons & Co., Ltd.	cxxiv
Colt Ventilation, Ltd.	xxviii
Cammer Cars, Ltd.	lxxxv
Compressed Paper Packing Ltd.	June
Confectioners' Vegetables Colour & Fruit Essences Co., Ltd.	Aug.
Cook, M., & Son, Ltd.	xxxi
Cooper, McDougall & Robertson, Ltd.	xli
Corn Products Co., Ltd.	July
C.P. Equipment, Ltd.	Aug.
Craigmillar & British Creameries, Ltd.	lvi
Crofts (Engineers), Ltd.	xv
Crompton Parkinson, Ltd.	July
Crookes Laboratories, Ltd.	cii
C.S.A. Industries Ltd.	July
Cuxson Gerrard & Co., Ltd.	cxiv
Dale, John, Ltd.	Aug.
Dalmas Ltd.	Aug.
Danks, Edwin, & Co., Ltd.	Aug.
Davey, Paxman, & Co., Ltd.	July
Dawson Bros., Ltd.	lviii
Denton Edwards Paints, Ltd.	ci
Dewey & Almy, Ltd.	cxv
D.M.P. Sales, Ltd.	lxxxvi
Dodge Bros., (Britain), Ltd.	lxxxi
Drakesons	cxxv
Drayton Regulator & Instrument Co.	Aug.
Duche & Knight, Ltd.	xci
Duche, T. M., & Sons, Ltd.	Aug.
E.C.D. Co., Ltd.	Aug.
Eimco (Gt. Britain), Ltd.	Aug.
Electropower Gears, Ltd.	Aug.
Electrolux, Ltd.	June
English Electric Co., Ltd.	Aug.
English Grains Co., Ltd.	June
Escher Wyss Ltd.	xc
Evans, Wm., Co., Ltd.	xlv
Fabbrica Macchine Industriali	Aug.
Felber Jucker, & Co., Ltd.	Aug.
Fenner, J. H. & Co., Ltd.	July
Fisher's Foils, Ltd.	Aug.
Fison, Edward, Ltd.	xx
Fisons Milk Products, Ltd.	lxxvii
Flexibox, Ltd.	lxxxiii
Flexile Metal Co., Ltd.	July
Follsain Wycliffe Foundries Ltd.	cxiii
Foodtech, Ltd.	ix
Foster Instrument Co., Ltd.	July
Fox, Samuel, & Co., Ltd.	Aug.
Fraser, J., & Son, Ltd.	cxvi
Fuller Horsey, Sons & Cassell	cxxii
Gardner, Wm. & Sons (Glos.), Ltd.	viii
Garvin, L. & Co., Ltd.	cxviii
Gas Council	lxxiv, lxxv
General Electric Co., Ltd.	lxxiii, lxxxviii
Gosheron, John, & Co., Ltd.	cv
Greening, N., & Sons, Ltd.	cxix
Gunson, R. W., (Seeds), Ltd.	xcviii
Hamburger, M., & Sons	cxvi
Harvey, G. A., Ltd.	cxvii
Havinden, G., Ltd.	June
Hawker & Co.	cxxii
Neston Equipment Co., Ltd.	lxxi
Hill Engg. Co. (Hull) Ltd., The Thomas	Cover iv
Honeywell-Brown, Ltd.	iii
Honeywell & Stein, Ltd.	June
Hopkinsons, Ltd.	cxxi
Howard Pneumatic Engg. Co., Ltd.	lxxix
Hunt, John, (Bolton), Ltd.	lxix

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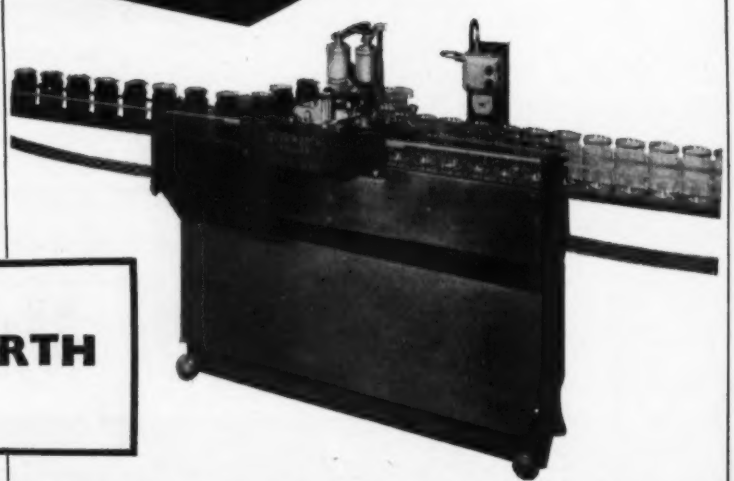

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Index to ADVERTISERS

	Page
Imperial Chemical Industries Ltd.	xxiv, xxxv, lxxviii, lxxxvii
Incinerator Co., Ltd.	Aug.
International Combustion, Ltd.	Aug.
Jackson, J. G., & Crockatt Co., Ltd.	cxvi
Jackson Henry (Liverpool), Ltd.	ci
Jenkins, Robert, & Co., Ltd.	cv
Jenner, A. & C., Ltd.	lxxxix
Johnson, A., & Co., (London), Ltd.	lxvii
J. & R. (Butchers) Suppliers, Ltd.	cxxvi
Kek, Ltd.	June
Kellie, R., & Son, Ltd.	liii
Kemball, Bishop & Co., Ltd.	cxxi
Key Glassworks, Ltd.	Aug.
Kestner Evaporator & Engg. Co., Ltd.	cxv
Kimpton Bros., Ltd.	lxxxiv
Kork-n-Seal Ltd.	xxxix
Kustner Bros., Ltd.	c
Lacy Hulbert & Co., Ltd.	Aug.
Lambert, L., & Co., Ltd.	cx
Lautier Fils, Ltd.	xlvi
Leiner, P., & Son, Ltd.	Aug.
Loders & Nucoline, Ltd.	v
Loma Metal Detectors, Ltd.	Aug.
London Fumigation Co., Ltd.	Aug.
London Oil Corporation, Ltd.	cxvi
Magnetic Valve Co., Ltd.	cxvii
Maitlands (Metal Works), Ltd.	cxiv
Mather & Platt, Ltd.	Aug.
May & Baker, Ltd.	cx
Measurement, Ltd.	lxxvi
Metaducts, Ltd.	Aug.
Metafiltration Co., Ltd.	ciii
Metal Box Co., Ltd.	xix, xxv, xxvi
Metal Closures, Ltd.	xxi
Metal Propellers, Ltd.	July
Metalrax (Conveyors), Ltd.	cxx
Milk Products (N.Z.), Ltd.	lxxii
Mitchell, L. A., Ltd.	lxv
Mono Pumps, Ltd.	xc
Monsanto Chemicals, Ltd.	Cover ii
Morton, Robert, & Co., Ltd.	Aug.
National Glass Works (York), Ltd.	Aug.
Negretti & Zambra, Ltd.	x
Norman Engg., Co.	Aug.
Oppenheimer Casing Co. (U.K.)	xii
Ormerod Engineers, Ltd.	cvii
Padley & Venables, Ltd.	xciii
P.A.M., Ltd.	Aug.
Passburg-Block-Hass, G.m.b.H.	July
Payne, P. P., & Co. Ltd.	lv
Permoglaze, Ltd.	cxviii
Permutit Co., Ltd.	xlvii
Peters, G. D., Ltd.	Aug.
Pilkington Bros., Ltd.	lxviii
Plenty & Son, Ltd.	xcii
Polak & Schwarz (Eng.), Ltd.	xxii
Porteus, G., & Sons, Ltd.	Aug.
Potter, F. W., & Soar, Ltd.	cxx
Premier Filterpress Co., Ltd.	Aug.
Pressoturn, Ltd.	cxii
Pulsometer Engg. Co., Ltd.	cxxvi
Purdy Machinery Co., Ltd.	Aug.
Rayner & Co., Ltd.	Aug.
Reads, Ltd.	Aug.
Redler Conveyors, Ltd.	lxxxii
Reed Corrugated Cases Ltd.	xlviii
Remploy, Ltd.	cvii
Renold Chains Ltd.	xi
Roche Products, Ltd.	vi
Rose, Downs & Thompson, Ltd.	cxi
Rubber Improvements, Ltd.	xiii
Ruislip Distributing Co., Ltd.	cxx
Sanders, H. G., & Son, Ltd.	lvii
Sandvik Steel Band Conveyors, Ltd.	liv
Saunders Valve Co., Ltd.	lxiii
Sauven Perforating Machine Co.	xcii
Semtex, Ltd.	Aug.
S.F.P. (Food Products), Ltd.	July
Shell Chemical Co., Ltd.	lxvi
Shuttle, E., & Co., Ltd.	Aug.
Simon, Henry, Ltd.	lxxx, xcix
Skerman, C., & Co., Ltd.	cxxv
SMALL ADVERTISEMENTS	cxxiii-cxxv
Smith & McLaurin, Ltd.	Aug.
Spencer-Bonecourt-Clarkson, Ltd.	cix
Spencer Hopwood, Ltd.	Aug.
Stacey, Frank, & Co., Ltd.	cxxii
Stainless Steel Vessels (London), Ltd.	Aug.
Star Welding, Ltd.	Aug.
Steel Co., of Wales, Ltd.	lxi
Stelcon (Industrial Floors), Ltd.	lx
Stevenson & Howell, Ltd.	cvi
Sturge, J. & E., Ltd.	Aug.
Sunvic Controls, Ltd.	Aug.
Taylor Rustless Fittings Co., Ltd.	cvi
Technoexport	xxxvi
Telegraph Construction & Maintenance Co., Ltd.	Aug.
Thames Board Mills, Ltd.	xcvii
Thomas, Richard & Baldwins, Ltd.	Cover iii
Tilghman's, Ltd.	June
Toplis Simpson, & Co., Ltd.	cxix
Union Food Machinery and Equipment Ltd.	cxviii
United Glass Bottle Manfrs., Ltd.	Aug.
United Indigo & Chemical Co., Ltd.	xiii
United Steel Companies, Ltd.	Aug.
United Wire Works, Ltd.	Aug.
U.S. Autowash Ltd.	xlix
Valrecchio, s.p.a.	cviii
Venesta, Ltd.	June
Vickerys, Ltd.	Aug.
Visco Engg., Co., Ltd.	Aug.
Viscose Development Co., Ltd.	xliv
Viskase, Ltd.	Aug.
WAECO, Ltd. (Fumite Division)	Aug.
Walker, Crosweller & Co., Ltd.	July
Warwick Production Co., Ltd.	xxix
Webster, Isaac, & Sons, Ltd.	cxviii
Weir, G. & J., Ltd.	Aug.
Wetter, J. C., & Co., Ltd.	civ
Whittaker, Arthur	cxxiii
Willcox, W. H., & Co., Ltd.	cviii
Williams (Hounslow) Ltd.	cii
Yale & Towne, Ltd.	Aug.
York Shipley, Ltd.	vii
Yorkshire Engineering & Welding Co., Ltd.	xcix
Youngman, W. C., Ltd.	xvi

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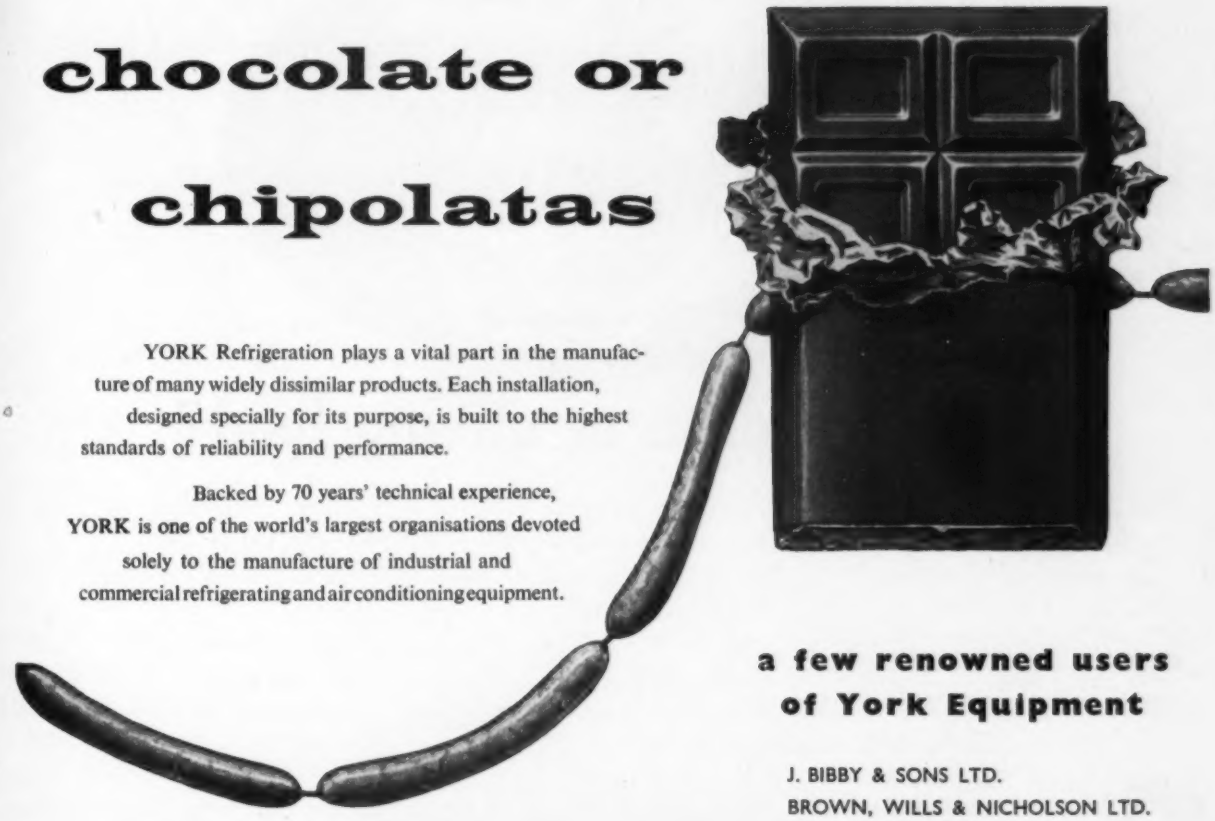

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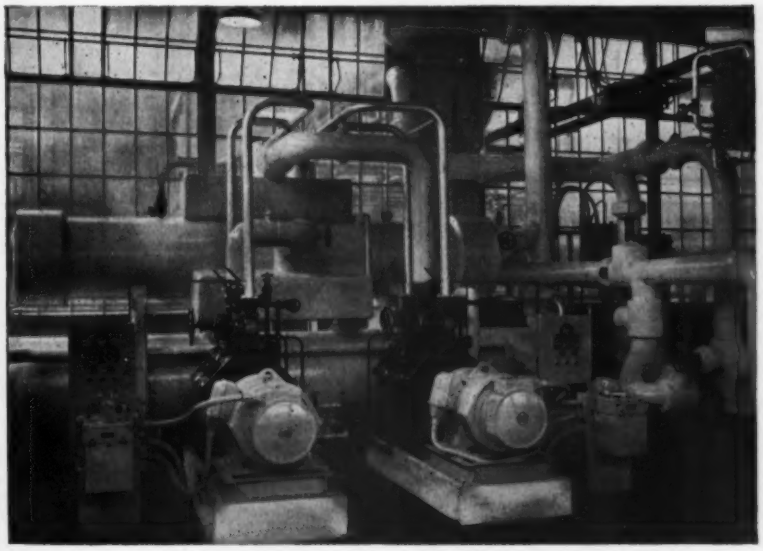

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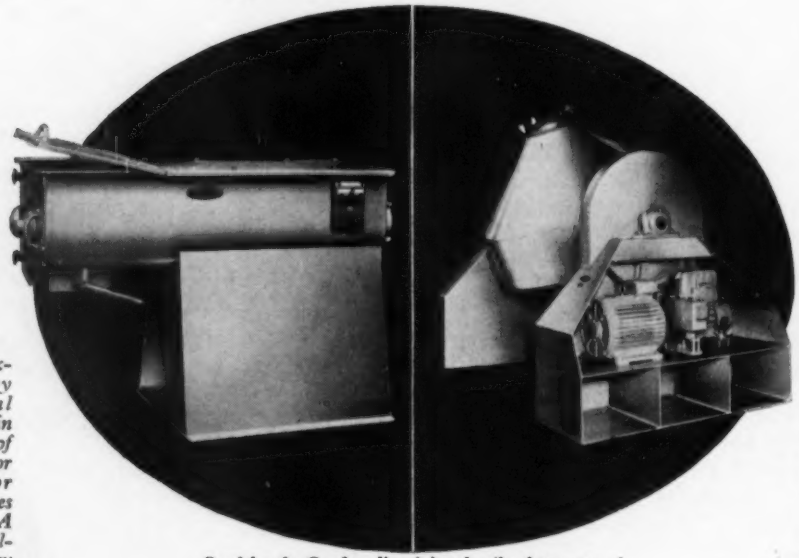

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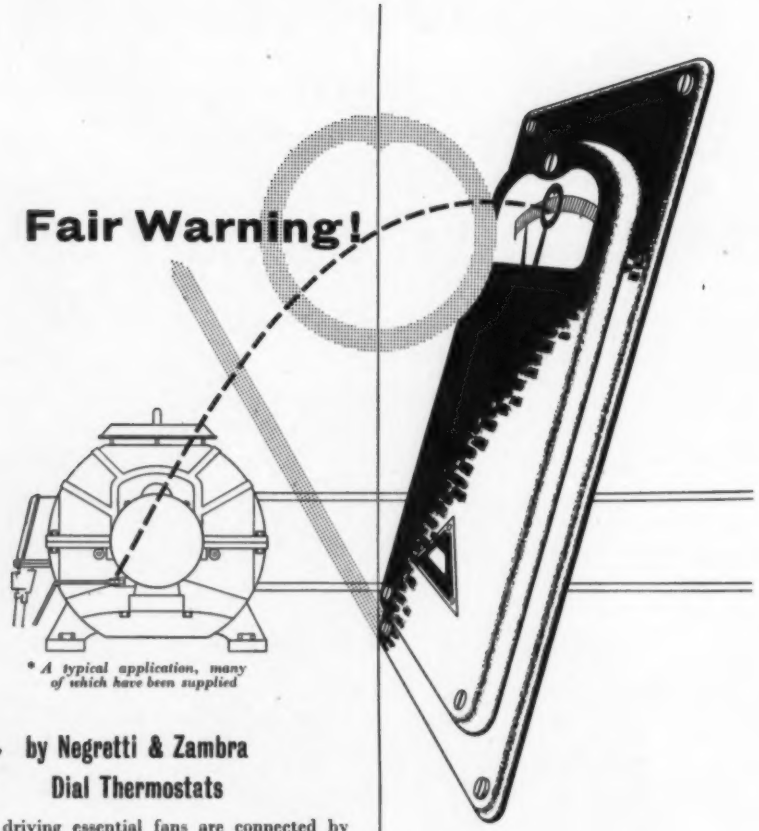

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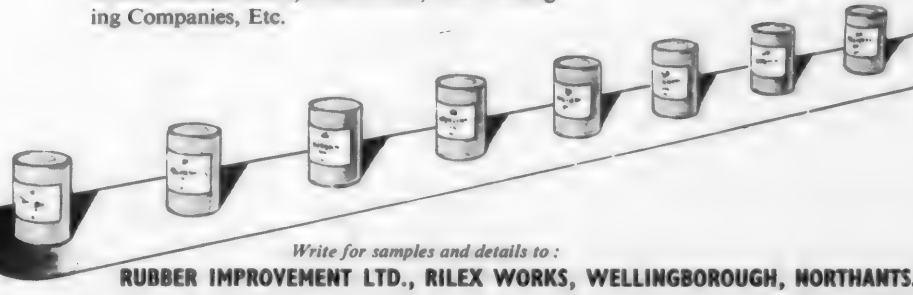

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Thoroughly reliable, well-planned transport
plays a vital part in successful trade, industry and agriculture.

With their nation-wide organisation and extensive resources, British Road Services are able to carry any type of traffic, in large or small quantities, with speed and care. They know no limit of size or distance. The business of British Road Services is to simplify your transport problems. And their ability to do so is proved by thousands of satisfied customers.

Your requirements may be for GENERAL HAULAGE, PARCELS-SMALLS collections and deliveries, the supply of vehicles on CONTRACT or the provision of special vehicles for HOUSEHOLD REMOVALS, INDIVISIBLE LOADS or LIQUIDS IN BULK. Whatever they are, British Road Services have the means to meet them efficiently and economically.

If you are not already a customer, write or telephone the Divisional Manager for your part of the Country, who will be happy to put you in touch with your nearest service point.

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(*London, Home Counties, Norfolk, Suffolk, Hampshire, Dorset*)
Carlow Street, London, N.W.1. Telephone: Euston 7030

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30 Harborne Road, Edgbaston, Birmingham 15. Telephone: Edgbaston 3841

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PICKFORDS
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205 High Holborn, London, W.C.1
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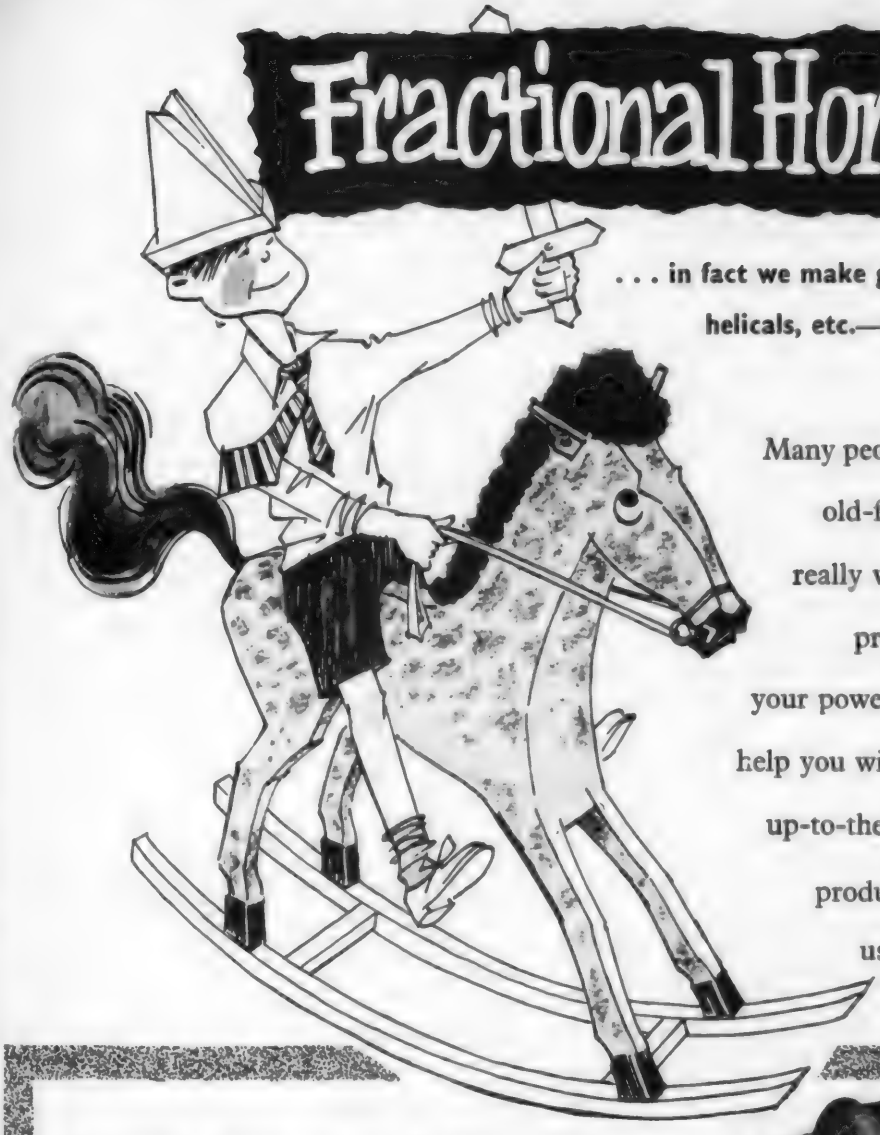
BRITISH ROAD SERVICES

Fractional Horsepower!



. . . in fact we make gears of all types—worms, double helicals, etc.—for powers up to 3,500 h.p.

Many people are content to jog along with old-fashioned methods. But if you really want to get somewhere with your production drive, you must put your power properly to work. We will help you with our unrivalled range of up-to-the-minute power transmission products. Please get in touch with us or your nearest Crofts Branch.

RITESPEED GEARED MOTORS & REDUCTION GEARS

from fractional up to 80 h.p.

(Standard units up to 20 h.p. from stock)

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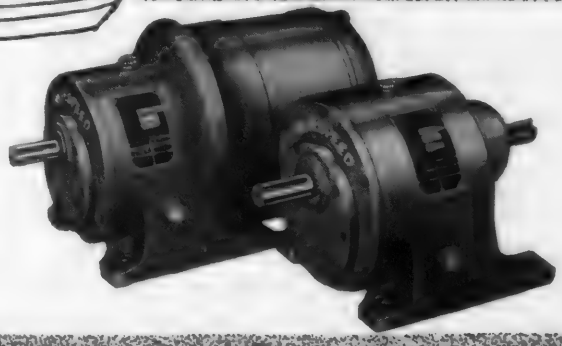

Crofts

CROFTS (ENGINEERS) LIMITED, BRADFORD 3

POWER TRANSMISSION ENGINEERS

Tel.: 65251 (20 lines) *Grams.: 'Crofters Bradford Telex'* *Telex 51-426*

LONDON OFFICE: 34 Norfolk Street, Strand, W.C.2

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★ *for speedy attention ring Bradford 65251. Ext. 34*

THIS *Youngman* PALLET

IS SPECIALLY CONSTRUCTED FOR HANDLING FOOD

The correct choice of pallet can mean considerable saving both in handling costs and storage space: the wrong choice can be disastrous. Would it be best made from hardwood or softwood? Should it be slatted? Reversible? Single-faced? If you're not sure of the answers, we'll be glad to help. As one of the largest pallet manufacturers in the country, with a standard range of over 50 different types, we feel sure our experience could be valuable to *you*.

For the latest news of pallets and stillages, and other materials handling equipment see our Industrial Equipment List. For your copy address Sales Dept: F/PS

W. C. YOUNGMAN LIMITED

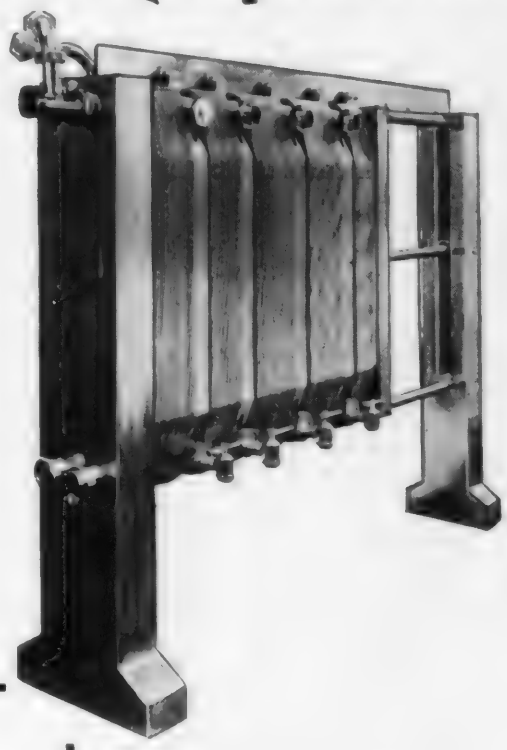
MATERIALS HANDLING DIVISION

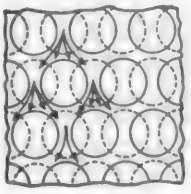
MANOR ROYAL, CRAWLEY, SUSSEX. TELEPHONE: CRAWLEY 1234 (5 LINES)

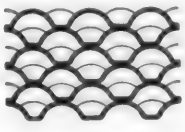
what's so SUPER about this PLATE equipment?

The unique construction of the heat transfer plates is the big reason for the high efficiency of Clarke-Built's Superplate equipment for continuous heating, cooling and regeneration duties in food and liquid processing. Superplate uses exclusive knob-embossed plates*, specially designed for uniform, controlled processing. Each plate is of one piece stainless steel for strictly sanitary operation and as Superplate requires fewer plates than ordinary equipment, it cuts maintenance costs, too. If you want to increase your capacity, you simply add more plates within the framework.

FOR FRUIT PRODUCTS, PURÉES, SAUCES, JUICES, SYRUPS, ETC., SUPERPLATE IS THE MOST ADVANCED AND ECONOMICAL EQUIPMENT OF ITS TYPE EVER MADE







*

THE SECRET OF SUPERPLATE'S SUCCESS

The exclusive knob-embossed surface of each plate and the design of individual flow spaces ensure rapid, uniform heat exchange and process flow.

THE CLARKE-BUILT 'ROTA-PRO' SYSTEM OFFERS YOU SUBSTANTIAL ECONOMIES IN PROCESSING. WRITE FOR DETAILS.

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SUPERPLATE EQUIPMENT

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an extensive range–

of **HIGH-SPEED CENTRIFUGALS** for rapid, hygienic food processing made of suitable corrosion resisting materials

Broadbent high duty sugar centrifugals in a modern sugar factory.

Over 90 years experience in the specialised field of centrifuging enables us to recommend the most satisfactory equipment for increasing your production

THOMAS BROADBENT & SONS LTD., HUDDERSFIELD.

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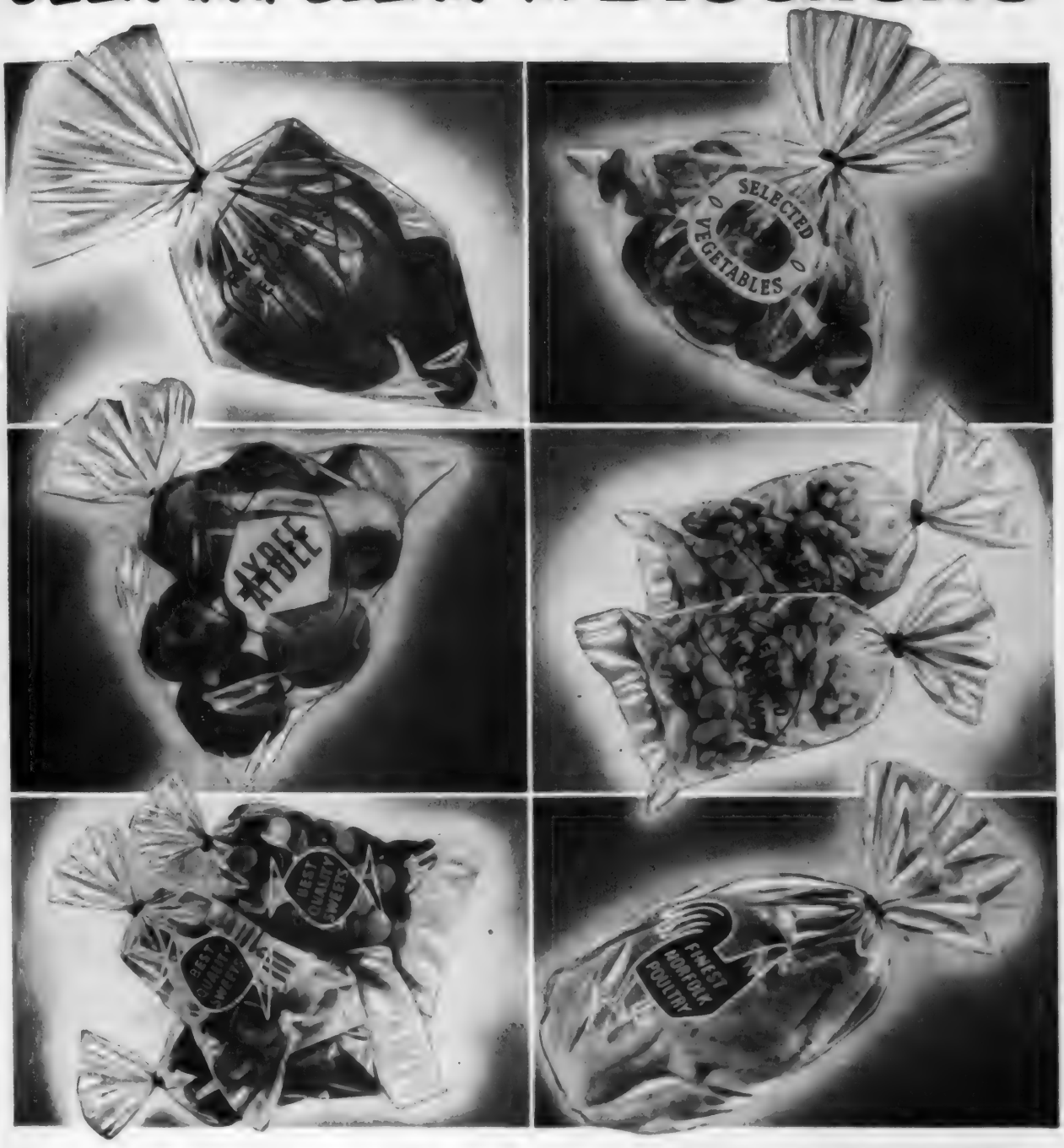
SEEN and CLEAN in Diothene



Diothene is a new flexible film for packaging. It is transparent for sales appeal, tough for protection and perfectly hygienic. Diothene has no odour, is non-toxic and cannot taint any food product. Diothene cannot cause corrosion in contact with metals. Heat sealing forms a strong durable weld, giving it excellent handling properties.

MB DIOTHENE (POLYTHENE)

The tough transparent film that *ADDS SALES APPEAL!*

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MALT EXTRACT

DRIED MALT EXTRACT POWDER

MALT FLOUR

An ever-increasing application to food industries

EDWARD FISON LIMITED

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Setting the seal..

ON QUALITY

The finishing touch to a quality product is the R.O. Seal. With or without the Pilferproof feature, the R.O. closure adds distinction and ensures satisfaction. The secret is that the R.O. Seal is not threaded until applied, when it is **rolled on** and takes the identical screw shape of the individual container. Special R.O. machines do this for you - and complete the filling-labelling line without interruption of flow. What a fine idea this R.O. Seal is !

...the R.O. seal

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"That's US all right-it must be P&S"

P&S FLAVOURS are so much better!

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THE FRUITS OF OUR EXPERIENCE

A wealth of experience lies behind these publications—solid experience based on a long and intimate acquaintance with the packaging problems of every kind of trade.

As specialists in transparent packaging materials and makers of the famous "Cellophane" cellulose film, British Cellophane Limited, through world-wide connections, keep their finger on the pulse of packaging: on merchandising trends and techniques, on wrapping methods and machinery. The fruits of this unrivalled fund of knowledge are passed on to manufacturers and retailers in down-to-earth aid and advice, in new and improved films.

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Whatever your product or packaging problem, here is valuable information to help you—free for the asking. In addition, the Company will be glad to assist you in many other ways, without obligation. Why not get in touch with British Cellophane Limited today?

"CELLOPHANE"—the first packaging film—and the greatest!

BRITISH CELLOPHANE LIMITED

Commercial Offices: 12/13 Conduit Street, London, W.1
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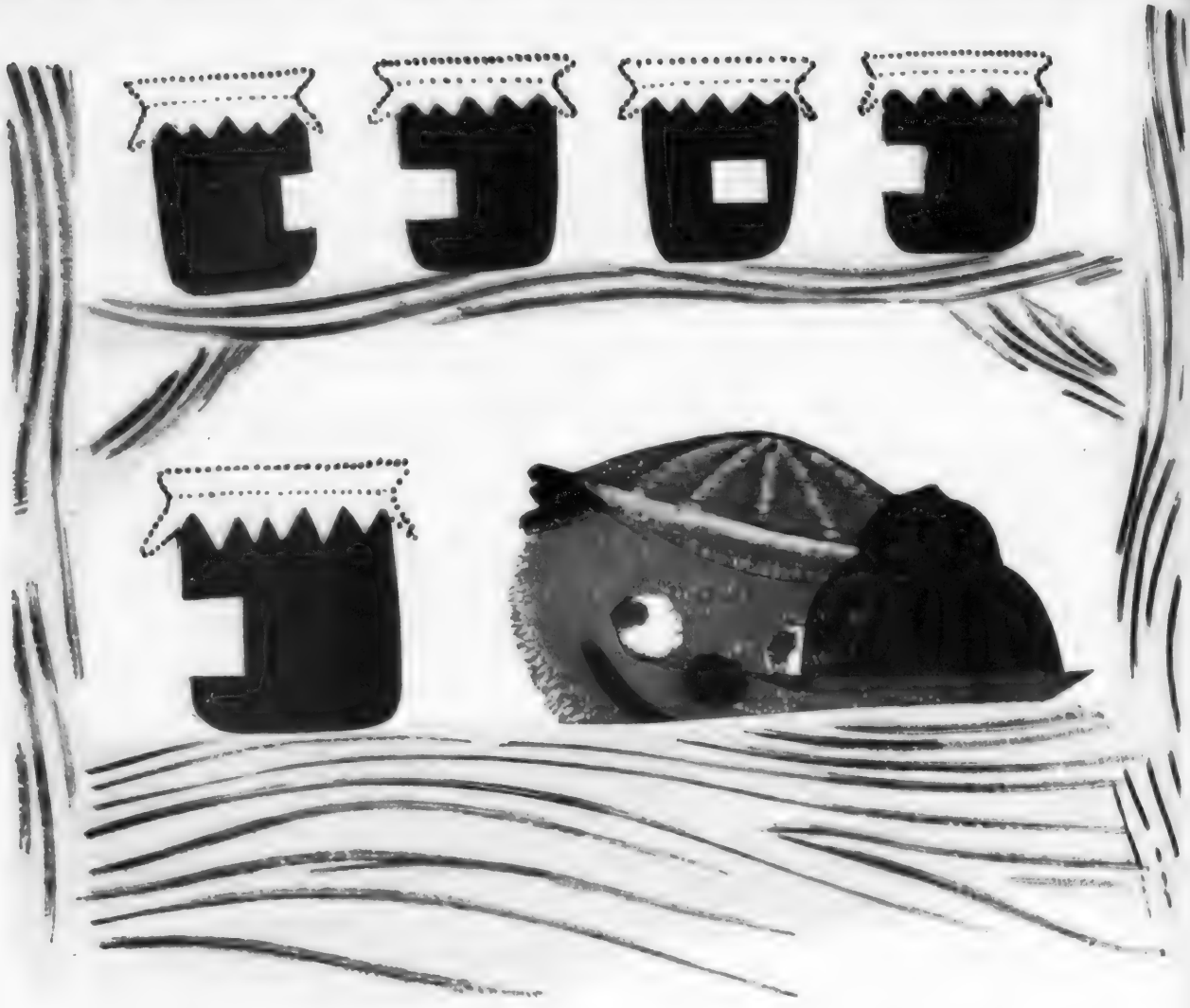
"Cellophane" is the registered trade mark of British Cellophane Limited and denotes the brand of cellulose film manufactured by them.



EDICOL SUPRA COLOURS

for JAMS, JELLIES and SWEETS

Edicol Supra Colours meet the highest standards of purity demanded by the most stringent regulations in the world.

Their purity is protected by delivery in sealed packages.

"Certified" supplies of many are available for food processors exporting to the United States.

Technical literature and full information on request

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CARTONS AND COMPOSITES

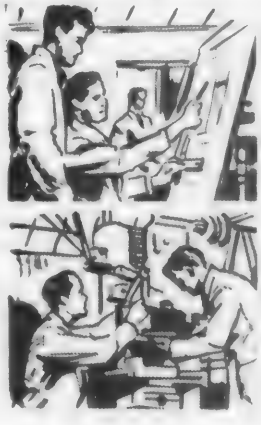
FOR THE FOOD INDUSTRY

Precision made for high-speed automatic filling

Each of these nationally known containers was produced by Metal Box and is the result of Metal Box 'know-how' at work.

Metal Box are expert at solving every type of packaging problem, whether it involves research into the reaction of contents with packaging materials, the examination of the effects of prolonged storage, or advising on filling or closing techniques. The result of using their specialist skills and experience is an exactly suitable container for each individual product. Metal Box 'know-how' serves the food industry well.

Metal Box *know-how* at work for you



Design Service
Metal Box designers have hundreds of case histories to call on when planning your container.

Engineering Facilities
To advise on the installation and maintenance of high-speed filling and closing machinery at the end of your production lines.

Research
The largest laboratories in the country devoted entirely to research into packaging problems.

Marketing Intelligence
A world-wide service that studies marketing trends and can supply up-to-the-minute information in any consumer field.

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Metal Containers · Paper Products · Flexible Packages · Plastic Films and Laminations

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MB3710

Cheaper filling with the GARDA CAP

The Garda is a standard vacuum cap used mainly (but not wholly) for packing hot filled preserves. Now the Metal Box Cap Group has developed an invaluable addition to the normal range of Garda Cap machinery. This is an automatic Garda Cap feed which replaces capping by hand, speeds up the capping process and consequently lowers packing costs. This unit demonstrates how new aids or accessories can extend the use and increase the efficiency of standard caps. It exemplifies too the constant quest of the Metal Box Cap Group for devices and ideas to improve the efficiency of their customers' standard closures. Please do not hesitate to make use of their services in this respect.

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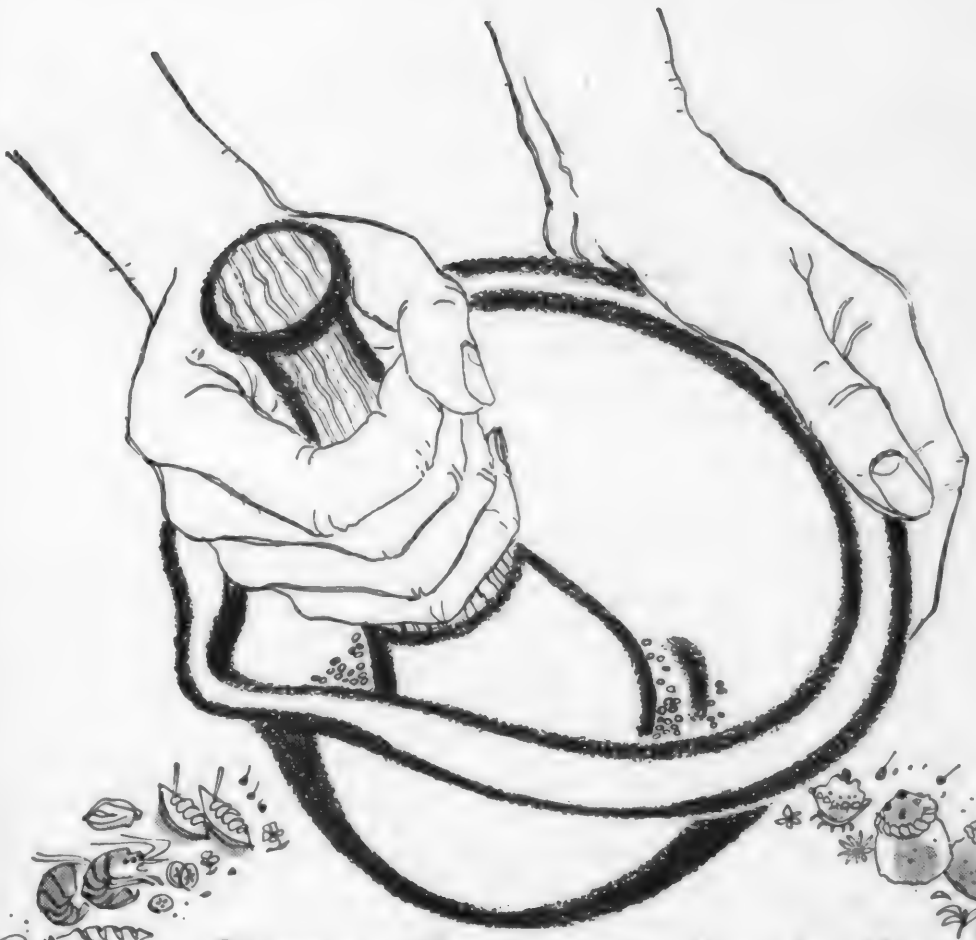


Stirring the imagination in the

BOEHM EXPERIMENTAL KITCHEN

In the Boehm Experimental Kitchen problems of food flavouring are tackled by experts. It is possible that they have tackled and mastered the kind of flavouring problem now causing *you* concern. So it might save you time and money to get in touch with Fredk. Boehm Ltd. immediately. Certain flavours in certain world-famous products owe their popularity to this organisation. The same skilled assistance is at your service, too, and it's free.

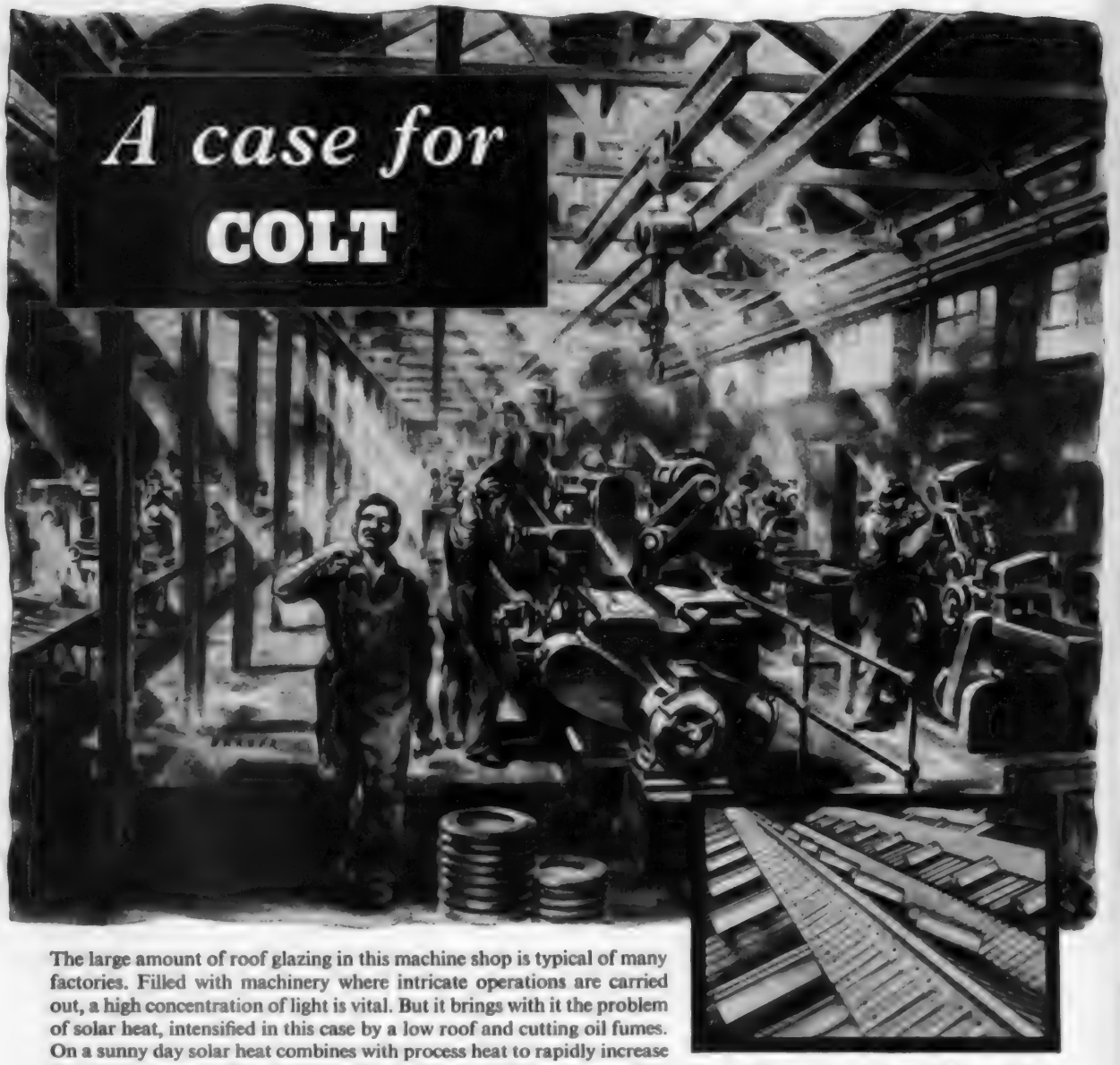
Fredk. Boehm Ltd., continues to produce and distribute:

M S G Mono-sodium glutamate 99% pure
YEATEX Autolysed yeast extract
PROTEX Hydrolised protein

Fredk. Boehm Ltd., 19 Bentinck St., London, W.1. Telephone: Wel 7933

Problem No. 2 Solar and process heat plus oil fumes

A case for COLT



The large amount of roof glazing in this machine shop is typical of many factories. Filled with machinery where intricate operations are carried out, a high concentration of light is vital. But it brings with it the problem of solar heat, intensified in this case by a low roof and cutting oil fumes. On a sunny day solar heat combines with process heat to rapidly increase the air temperature; this, together with a build up of oil fumes trapped by the low roof, inevitably results in falling output and an increase in human errors and accidents. This is a typical case, calling for Colt Ventilation, and one that we have often met and overcome in our dealing with 9,000 major industrial and commercial organisations.

Whichever your problem, be it heat, fumes, smoke, steam, or condensation, Colt can cure it.

The conditions shown above could have arisen at Drummond Bros., Ltd. Guildford but in co-operation with their architects, Messrs Brownrigg & Turner, B.A./A.A.R.I.B.A. and Colt Ventilation Ltd., they installed 50 Colt SRC.2046 High Duty Roof Extractor Ventilators as shown in the inset above. On the hottest day the working level temperature rise is limited to less than 10°F and the atmosphere at working level is quite free from cutting oil fumes.

COLT

Send for Free Manual on Colt Ventilation to Dept. V 2

VENTILATION

COLT VENTILATION LTD · SURBITON · SURREY

TELEPHONE: ELMBRIDGE 6511 (10 lines)

U.S.A. Subsidiary: Colt Ventilation of America Inc., Los Angeles.

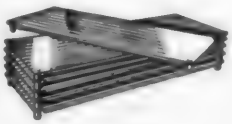
Branches at: Birmingham, Bradford, Bridgend (Glam.), Bristol, Coventry, Dublin, Edinburgh, Glasgow, Liverpool, London, Manchester, Newcastle-upon-Tyne, Sheffield, and Warwick.

Agents in: Australia, Belgian Congo, Canada, Cyprus, India, Indonesia, Madagascar, Malaya, Mauritius, New Zealand, Pakistan, Portugal, North and South Rhodesia, and South Africa.

G.104

The CHIEF ENGINEER says—

'RACKS are out of date—we use WARCO STACKING TRAYS'



STACKING TRAY (Catalogue No. TB.27153)

As illustrated above, having dimensions of 26¾" × 14¾" × 2¼" made as pressings from 16g Light Alloy with special corner stacking features which have convex locating dimples for greater efficiency and giving ¾" air space when stacked. Alternative brackets giving greater or less air space can be fitted if required.

Also available with a depth of 1⅜" (TB.27151) and both depths can have perforated bases.

WARWICK
'WARCO'
Reg. Trade Mark
ENGLAND
First Choice for Aluminium Equipment

WARWICK PRODUCTION COMPANY LTD

IN ASSOCIATION WITH **ALMIN LIMITED** STOKE POGES · BUCKS

BIRMINGHAM ROAD, WARWICK TELEPHONE: WARWICK 693-696

Wood Chopping Machine with Limit Switch

Small Push Button Starter on Band Saw

Star-Delta Starter on Seed Cleaner

Flush Mounting on Shoe Finishing Machine

BROOK ELECTRIC MOTOR CONTROL GEAR

You can find a BROOK contactor for all your control problems. All types are tested to B.S.S. No. 587

EASY TO FIX

Designed to give maximum protection with compact size and sturdy contactor units. Clearly marked terminals. Visual ON-OFF indicators.

SIMPLE TO MAINTAIN

HUDDERSFIELD • • • ENGLAND

56/21

Almost a Century...

since we first began our Service to Industry in 1860. Now, re-equipped with new machinery, new methods and flow production for the handling and manufacture of **corrugated fibreboard containers** and **fitments,** this modern factory is solving the packaging problems of our customers. No doubt we can help you too! We offer a new service to industry—protection **plus** for **your** product. Bring your packaging problems to

M. COOK & SON LIMITED

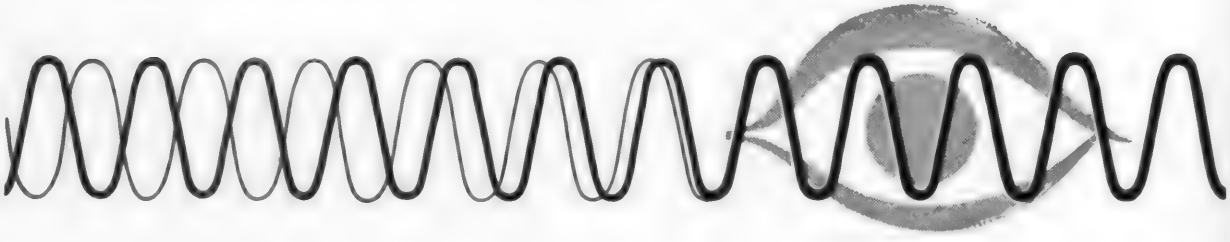
HATFIELD · HERTS

TELEPHONE: HATFIELD 2323 (5 LINES)

Electronic control does it quicker

Automatic control cuts out innumerable hold-ups in production and adds valuable time to every working day. It can be applied in a great many different ways, from a simple timer that stops and starts machines, to the complex feed-back devices that regulate machines against a standard reference while they are in action, as in register control on colour-printing presses.

Whatever your process you would find it well worth while to consider automatic control in one form or another. It is more exact than is humanly possible; rejects are reduced; quality is improved; the flow of production is quicker and smoother; it uses little current and calls for little maintenance. In fact, you get higher production at lower cost. This is only one of the ways in which electricity is playing a vital part in the drive for higher productivity.



Electricity for Productivity

Ask your ELECTRICITY BOARD for advice and information, or get in touch with E.D.A. They can lend you, without charge, films about the uses of electricity in industry. E.D.A. are also publishing a series of books on Electricity and Productivity. Titles now available are: Electric Motors and Controls, Higher Production, Lighting, Materials Handling, and Resistance Heating. Price 8/6. or 9/- post free.

Issued by the British Electrical Development Association, 2 Savoy Hill, London, W.C.2

For sure protection of canned foodstuffs

IT'S THE Lacquer THAT COUNTS

Yet another addition to the Coates range of Preservex lacquers. The Lacquer to guard against blown cans, can corrosion, and sulphur staining—in fact, to be recommended for all types of canning.

Coates **PRESERVEX**
UNIVERSAL LACQUER

COATES BROTHERS INKS LIMITED
EASTON STREET, ROSEBERY AVENUE, LONDON, W.C.1.

SERVE THE PRINTING WORLD

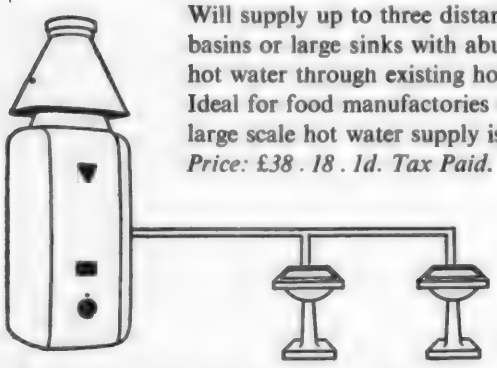
THE LAW SPECIFIES 'HOT WATER'

Here's why you should specify Ascot!

The Ascot hot water system makes it easy and economical for everyone in the food and catering trades to comply completely with the new, stringent Food Hygiene Regulations specifying a controlled hot water supply. An Ascot gas water heater gives you an instant, endless flow of really hot water at low cost —hot water that's on tap from the moment you open your premises right up to when you shut up shop. Ascots are easily and cheaply installed, and the wide range available includes models to meet every need of every food trader.

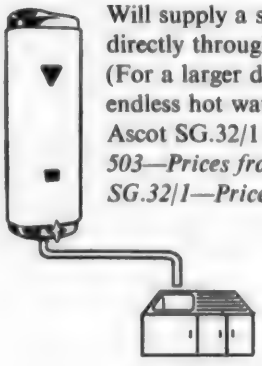
Whatever your hot water problem under the new legislation, Ascot can solve it. Full information from any gas showroom or from Ascot's own Advisory Service.

ASCOT 709 LARGE MULTIPOINT



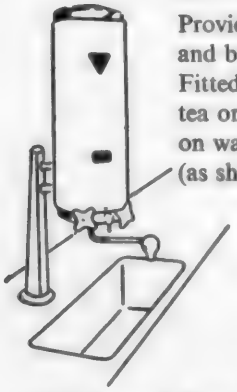
Will supply up to three distant handbasins or large sinks with abundant hot water through existing hot taps. Ideal for food manufactories where a large scale hot water supply is essential.
Price: £38 . 18 . 1d. Tax Paid.

ASCOT 503 SINK WATER HEATER



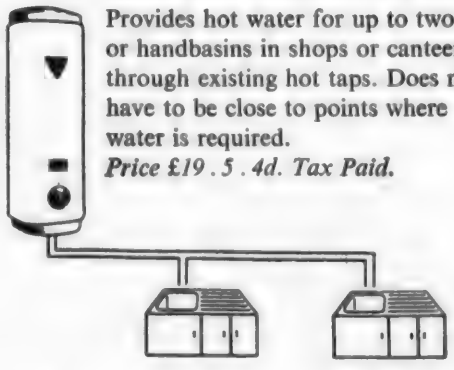
Will supply a sink or handbasin directly through a swivel spout. (For a larger direct supply of instant endless hot water to a big sink, the Ascot SG.32/1 is ideal.)
503—Prices from £14 . 17 . 3d. Tax Paid.
SG.32/1—Price: £33 . 15 . 4d. Tax Paid.

ASCOT 509 BOILING WATER HEATER



Provides warm or hot water instantly and boiling water in less than a minute. Fitted with 3-heat control. Ideal for tea or coffee making. Can be installed on walls, or on shop or bar counters (as shown) on an Ascot pillar support.
Price: £25 . 6 . 6d. Tax Paid.

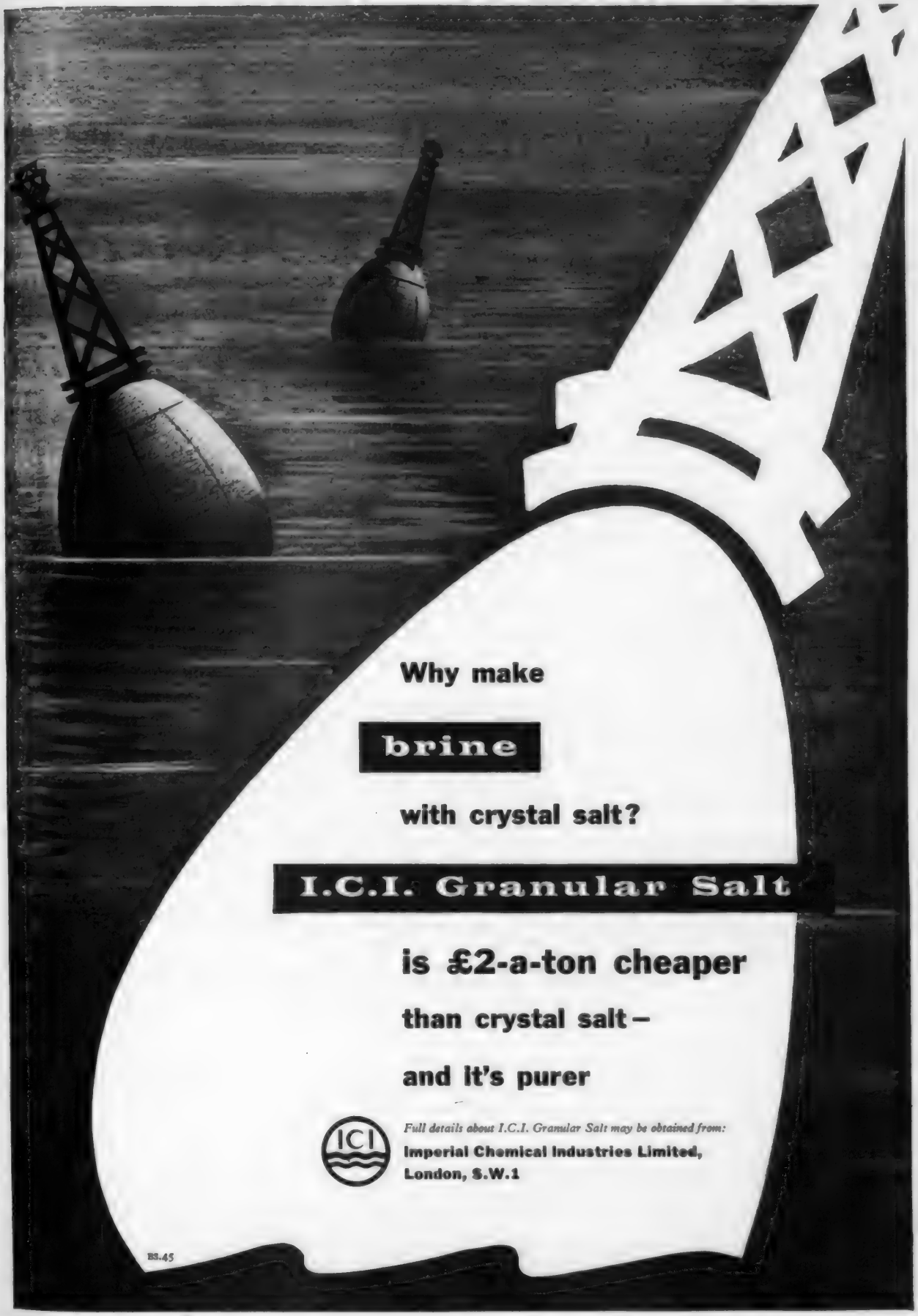
ASCOT 503/4 SMALL MULTIPOINT



Provides hot water for up to two sinks or handbasins in shops or canteens through existing hot taps. Does not have to be close to points where water is required.
Price £19 . 5 . 4d. Tax Paid.

Where hot water is essential...Ascot service is providential!

ASCOT GAS WATER HEATERS LIMITED · 255 NORTH CIRCULAR ROAD · NEASDEN · LONDON · N.W.10
WHG/A253


Why make
brine
with crystal salt?
I.C.I. Granular Salt
is £2-a-ton cheaper
than crystal salt—
and it's purer
Full details about I.C.I. Granular Salt may be obtained from:
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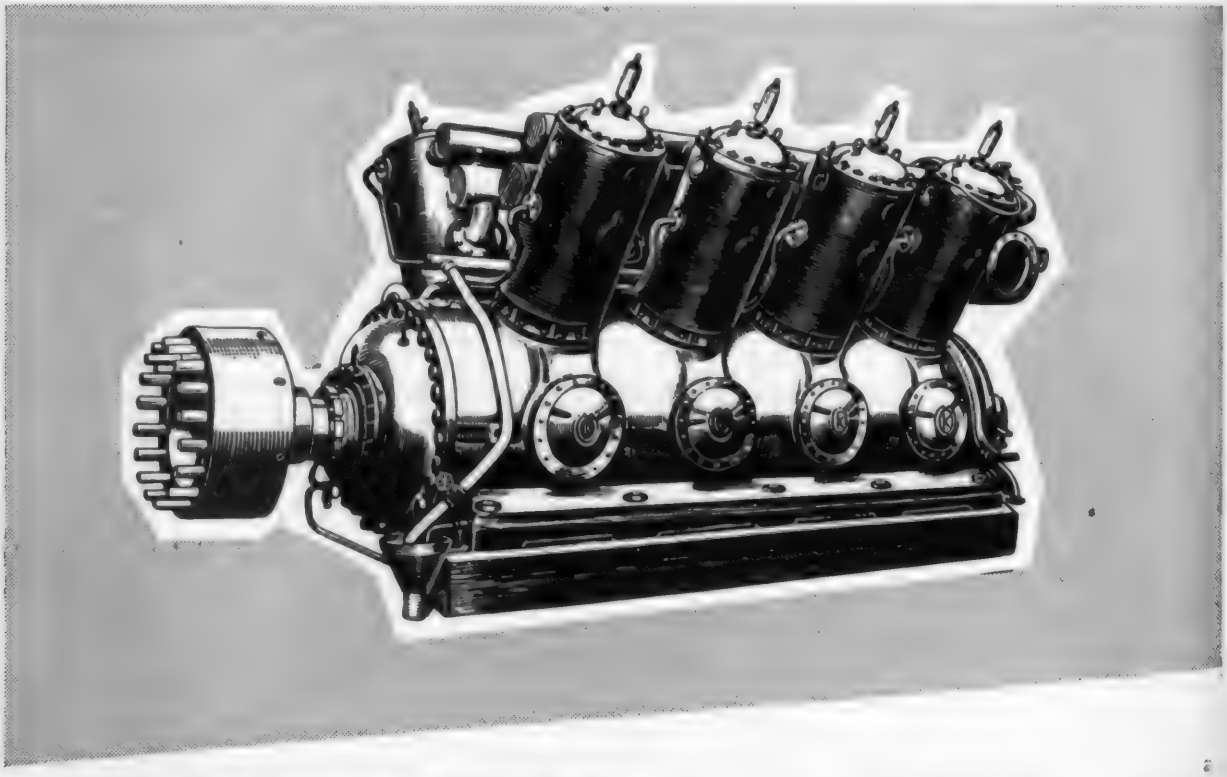
COOLING EQUIPMENT

Czechoslovak Engineering Works supply and erect complete cooling equipment and individual machines for

- ice plants
- breweries
- slaughter houses
- storages
- food industry
- chemical works and laboratories
- dairies
- fish product industry
- ice rinks, etc.

We shall work out the project and quotation to comply with your technical requirements.

We have long years of experience in the installation of such equipment in different climatic conditions.



TECHNOEXPORT PRAHA CZECHOSLOVAKIA

All-new BLISS bodymaker has 450-a-minute speeds!

Compact NEW design speeds changeovers assures dependable operation

One of the industry's fastest, the new 403 Bodymaker is capable of 400 to 450 per minute *shift-after-shift-after-shift*. And here's why. Short-stroke, short-length cranks permit higher speeds; well-balanced components combined with robust construction practically eliminate vibration. In addition, all adjustments are accessible, quickly and easily made which lessens downtime. Simple to set up, the 403 is readily adaptable for No. 202 to No. 404 plain, lacquered or lithographed sanitary can bodies.

The 403 is the latest in Bliss' new line of automatic, high-speed can machinery, and with more to come from the new can machinery programme, you'd be wise to keep your eyes on Bliss.

These modern Bliss features step up production, step down costs

- Compact table with no idle station means no wasted space
- Actuated in-and-out knurler provides more even solder flow
- Notcher, double-action edger quickly and easily adjusted
- Cam-actuated overhead blank lock and fixed forming horn assure perfect control of blank and can body
- Overhead can carrier drive permits easy accessibility to solder attachment
- Solder pot is adjustable, quickly and easily removed
- Inside or outside seam solder attachments are available

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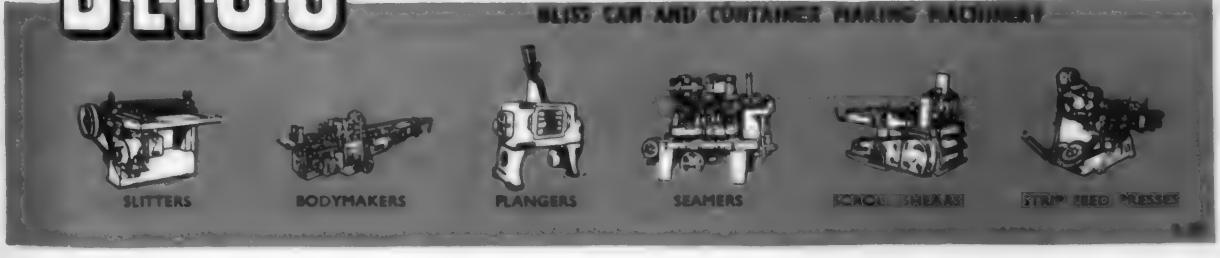
Telephone: ABBEY 3451

BLISS on your machine is more than a name . . . *it's a guarantee!*



for the hygienic handling of food

Braby stacking trays

Braby Aluminium Alloy trays are supplied with or without ventilating louvres or with slotted bottoms for draining. Pressed lids and perforated false bottoms are available if required without interfering with the stacking facilities.

Supplied in two sizes:—

20" x 15" x 6" deep, capacity 1660 cu. in.
18" x 13" x 5" deep, capacity 1000 cu. in.

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DEATH to Ephestia elutella

The Cacao moth, *Ephestia elutella*, is a most serious pest of stored grain, tobacco, cocoa beans, dried fruit, chocolate, etc. Commodities attacked acquire a sour smell and are contaminated by the webbing and droppings of the larvae. Only energetic measures, therefore, can prevent serious losses. Spraying with an appropriate "Pybuthrin" insecticide is the safest and most effective answer. Containing African pyrethrum synergised with piperonyl butoxide, "Pybuthrin" is completely safe to use wherever cereals or other foodstuffs are processed or stored, and is the basis of a new range of potent, non-poisonous Cooper insecticides. If you have an insect pest problem in your premises, write for free advice and further information about "Pybuthrin" insecticides.

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For over 100 years, we have been importing gums from the east in their natural form.

The experience we have gained, together with our modern grinding plant, enables us to maintain guaranteed standards.

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Presented with pride!

Seal your pack with " Viskrings " and establish confidence between you and your consumer. YOU can be confident that your bottling will reach the consumer perfect and intact. The CONSUMER will be confident that the contents are genuine and as expected—a fine product, perfectly presented. Seal all stoppered and screw-capped bottles with " Viskrings ". There is a " Viskring " to fit every bottle neck, available in a wide range of colours. " Viskrings " can be printed with your brand symbol. Send your container complete with primary closure to us for fitting. We will return it with samples and quotations for any quantity.

- " Viskrings " can be applied rapidly by hand—no machinery is necessary.
- They are self-adjusting.
- They prevent the blowing or riding of stoppers.
- They prevent the movement of screw caps once they are tightened.
- They afford protection for branded products and reduce pilferage and evaporation.
- CELLULOSE CLOSURES . . . Contain No Metal . . . Require No Adhesive.

for your Sales sake fit "Viskrings"

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NSF GRADE

A pectin of standard "Elpex" setting strength but specially prepared for the darker jams where maximum clarity is not essential.

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For specialised products such as Jelly marmalade. In colour and clarity, "X.L.Grade" replaces powdered pectins at less than half the cost.

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Guaranteed setting temperature. Specially suited for 7's, 14's and bulk packs of jam where ordinary pectin causes caramelisation and pre-setting.

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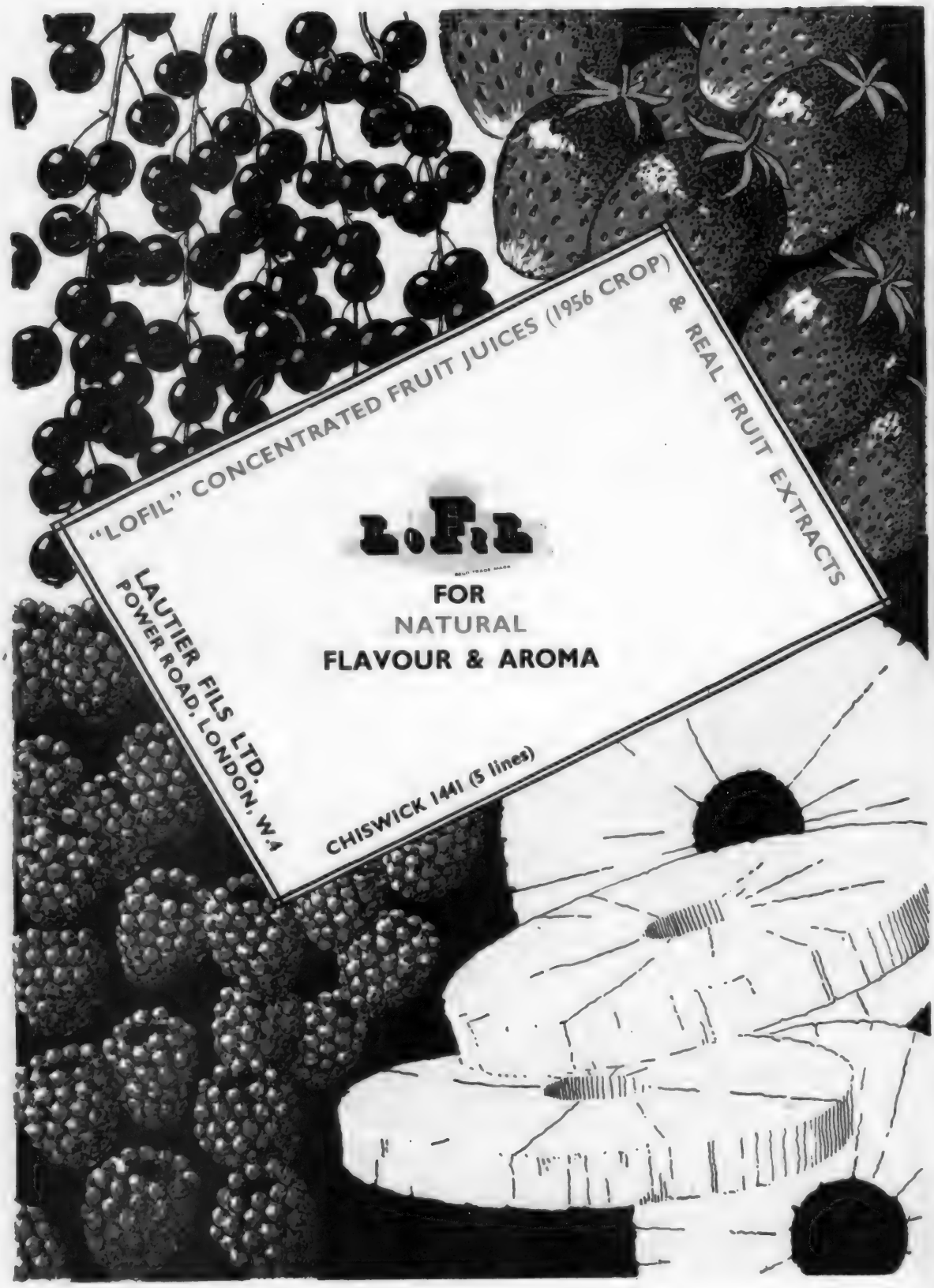
TWENTY-FIVE YEARS ago, William Evans & Co. pioneered the manufacture of Pectin in Great Britain. Their unique experience is freely available to jam makers through the Technical Advisory Service. Sample quantities for production testing will be sent on request.

WILLIAM EVANS & CO. (HEREFORD & DEVON) LTD., WIDEMARSH, HEREFORD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POWER ROAD, LONDON, W.4
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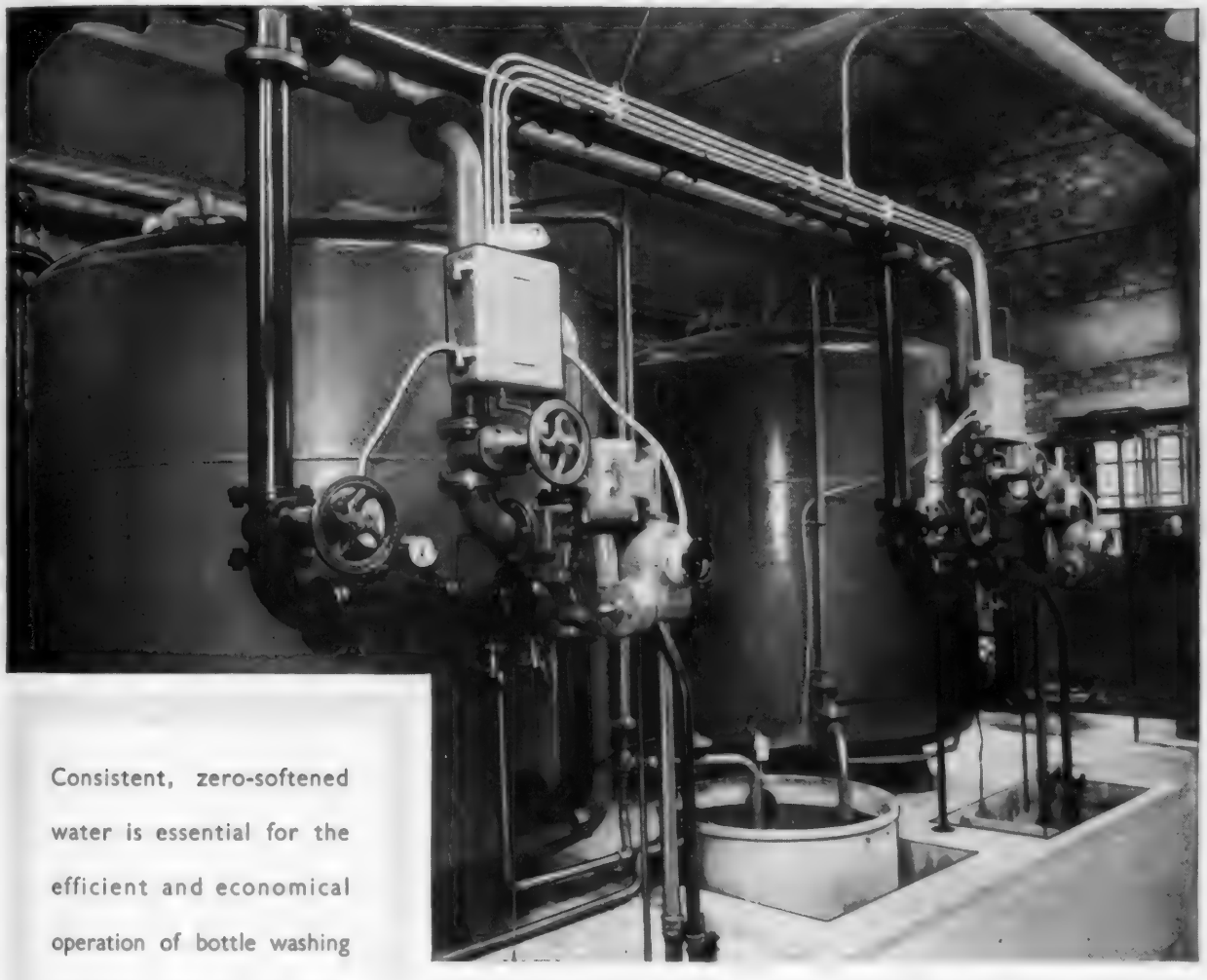
PERMUTIT Water Softening Plant ensures clean, bloom-free bottles...



Consistent, zero-softened water is essential for the efficient and economical operation of bottle washing machinery and for the maintenance of the highest standards of bottle cleanliness. These are among the many reasons why Permutit Water Softening Plant is installed at this most modern dairy.

...at the South Morden Bottling Plant of EXPRESS DAIRY

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The Rep from Reed has an ace in every pack

THE BEST card in the packaging business is the one introducing the Rep from Reed. Backed by the pioneers in Britain of corrugated fibreboard cases, he can offer you unequalled experience ; a research department equipped to deal with your packaging problems ; the productive capacity of eight factories resulting in a far more reliable service—and highly competitive prices. Above all there is a personal sales organisation which covers the entire country.

Reed Corrugated Cases Limited are the leading manufacturers of corrugated fibreboard products in the United Kingdom.

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Avenue 12, on the first floor near the Philbeach escalator

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VEHICLE WASHING UNIT

More and more prominent organisations are installing "WASHMOBILE" as a means of complying with The National Standard of Food Hygiene The "WASHMOBILE" COMMERCIAL Unit consists of a Multi-jet Gantry-on-track, Shampoo loaded, with two High Pressure Water Guns, Vacuum/Air Cleaner and fixed Ladders each side. The Vehicle stands still—the "WASHMOBILE" traverses and washes. COMMERCIAL "WASHMOBILE" Units are constructed to meet the individual Fleet-Operators' special requirements COMMERCIAL Models are never held in stock and, being built to customers' specifications, maximum efficiency of performance is achieved.

SPECIFICATION

Multi-Jet Gantry:
Fitted with grease-packed ballrace wheels. Inside heights as required. (Popular sizes 10′ 6″, 11′ 3″, 12′ 0″ inside heights). Width 10′ 0″ or 10′ 4½″ as required.

* **Pump:**
Worthington-Simpson Monobloc 5-H.P. with Squirrel Cage, and Push Button Starter.

* Standard voltage Pump Units are 400/440v, 3ph. Special voltages to order.

Storage Tank:
200-gall., 14 gauge galvanised, with Ball Valve.

Track:
Length 30ft or as required.

Shampoo Dispenser:
In special tank built in Machine, fitted with Isolator and Regulator Valves, allowing variations in ratio-to-water. Self Mixing.

Ladders:
2 (Fixed) Metal.

Air/Vacuum Cleaner:
Bayonet-fitted for use each side of Machine.

COMMERCIAL UNITS WASH ALL VEHICLES BELOW INSIDE GANTRY HEIGHT INCLUDING MOTOR CARS.

BRITISH MADE THROUGHOUT

Prices include Sites surveying, lay-out Planning, delivery, Installation and After-sales Service. The only extras are Shampoo, Mitts and Brushes as required.

"WASHMOBILE" PLANT CONFORMS WITH ALL THE REGULATIONS PERTAINING TO WATER, ELECTRICITY AND FACTORY AUTHORITIES' REQUIREMENTS.

WASHMOBILE

THE ONLY SPECIALISTS IN VEHICLE-WASHING EQUIPMENT

U. S. AUTOWASH CO. (LONDON) LTD., 1, WYTHBURN PLACE, LONDON, W.1

Telephone: PADdington 1407-8

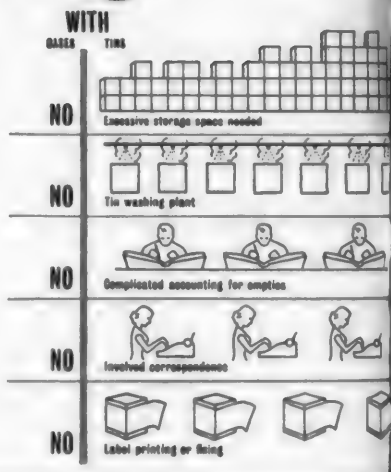
Before use fibreboard cases pack flat, can be handled 1,000 at a time. Made up cases (left) stack strongly, look good, are easily handled.

Taking the biscuit

There's a revolution afoot in the biscuit packaging field — the replacement of the traditional tins by non-returnable fibreboard cases. One of the first to make the big changeover was the famous firm of McVitie & Price, Ltd. Pioneers of increased productivity in the industry, their London factory represents one of the most advanced essays in automation in this country. Today over 90% of its production is pre-packaged for sale.

The changeover to fibreboard cases has brought many advantages. Before use they pack flat, do not clutter up valuable factory space. They come to the factory ready printed, so cutting out costly labelling and printing. The manufacturer and his customers alike benefit from non-returnable cases. Storage space required for tins can be put to productive use, less money is locked up in stocks. There is no need for washing and sterilising plant and no cumbersome accounting or correspondence over the crediting of returned empties.

Today, a considerable proportion of biscuits are pre-packed. Pre-packing gives inner protection against moisture. The fibreboard case gives all other protection required.



Drums to the rescue

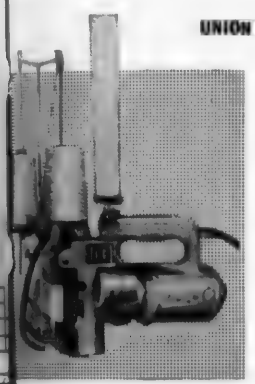
There seems to be no end to the uses of fibre drums. In their latest role they carry the emergency kit supplied with the rubber inflatable dinghies made by the R.F.D. Company Ltd., which are carried all over the world by an increasing number of fishing and merchant vessels. Bowater drums, with specially strengthened walls and lids at both ends are part of the equipment of each dinghy. They are emergency packs containing rations, first-aid outfit, pyrotechnic and other signalling equipment. Single face corrugated sheets and discs are used inside the drums to protect and separate the various items.

It is their combination of strength and lightness which makes Bowater fibre drums ideal for use in this vital role. Yet this is only one of the many parts played by these versatile containers. They carry in complete safety an increasing number of valuable chemicals and other raw materials for industry.

PACKAGING BULLETIN

on-stop sack service

eighing the contents, filling and closing the sack forms one *con-*nous operation on Bowater equipment. There is a wide variety of achines to choose from, three of which are shown here. Bowaters e the only people who can supply equipment for both valve and n open mouth sacks. A complete technical advice and maintenance rvice goes with the purchase of every Bowater weighing, filling or ing machine.



UNION SPECIAL *PORTABLE* SEWING HEAD

A hand-operated sack closing unit that weighs only 9½ lbs. Electrically powered, it is designed for manufacturers who require a sewing unit that can be easily moved and for those whose sack usage is small. Will close up to 6-ply gussetted multiwall paper sacks. Produces single chain stitch or double-locked chain stitch, with adjustable spacing. Top and bottom feeding mechanism and mechanical thread cutting device. Lanyard supplied to suspend the machine from operator's neck and shoulders. Bowaters are the only paper - sack manufacturers in the U.K. who can supply this machine.

NEW 5007 P.S. PACKER

igned for packing free-flowing dered materials with some degree compressibility, the machine s on the taper screw conveyor ciple. Specimen tonnage rate: s of animal feeding stuffs per in cwts. For higher output two hines can be mounted side by without employing additional r. This machine can be supp- for filling both paper and jute sacks. It is used where high ut is required and works with tomatic weighers.

5003 P.B. PACKER

Belt-packer for pre-weighed charges of free-flowing granular or crystalline materials. Automatic sack settling and discharge gear built-in. Specimen rates per hour in cwts: 20 tons of granular fertiliser, 7½ - 10 tons of cattle cubes. For higher performance two or more machines can be installed in series without employing additional labour. Can be used with *all* types of automatic weighers.

SUCCESS STORY FROM SITTINGBOURNE

Capacity up, sales up — that's the story from Bowaters waxed wrapper department at Sittingbourne. Latest development is the installation of a new flexographic printing machine. This high-speed British machine went straight there from the International Printing Exhibition in London last July. It prints in four colours from rubber plates.

New waxing machines and the latest slitter re-winders have also been installed. The latter can produce coils and reels of almost any width for use on automatic wrapping machines. Those who use Bowater waxed wrappers now get the same high standard of protection plus even more compelling sales appeal.

Introducing . . .

. . . the 'DRIP-CUP' ice lolly bag

This Italian novelty which Bowaters are introducing over here is for the manufacturer who is alive to ways of increasing sales appeal in this competitive field. Main sales points are hygiene — it keeps clothes and fingers clean — and novelty value for children. The bags are made in glassine or greaseproof and can be printed in two colours, while the Bowater Studio will design them for you. But judge their quality and attraction for yourselves — Bowaters will be pleased to send you free samples on request.

Inquiries on any aspect of Bowater packaging will be welcomed by

Divisional Sales Manager, Packaging Division, Bowater House, Stratton Street, London W1 MAY 5000

N.B. The corrugated case interests of Bowaters have now been merged with Eburite to form Bowater-Eburite Limited.

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JAR DRYING CONVEYOR

JAR LABELLING MACHINE

AUTOMATION in the Jam Factory

Reduce costs and increase production with Kellie Automation Equipment. Write for details of how your jam finishing production line can be made fully automatic.

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We should welcome a discussion regarding YOUR problems.

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MATURITY

VITALLY IMPORTANT FOR CHRISTMAS CAKES AND PUDDINGS

HAPPY CHRISTMAS

PERFORMANCE OF FATS

In advance baking of Christmas cakes and puddings puts all ingredients to the test. During the maturing period, fats in particular must give a reliable performance : they must not break down, turn rancid or lose flavour. Above all, the fat must ensure a good shelf-life and a rich, mellow product for the consumer.

CBC FATS RELIABLE

CBC fats stand up to the maturity test. Marvello cake margarine, for example, has the stability needed for perfect maturing. It imparts and retains a mellow background flavour and a fine aroma ; it also produces a batter with maximum fruit-carrying ability. For those who prefer them, the CBC range of shortenings are equally effective particularly for Christmas Puddings. For the best results, CBC fats can be relied on every time.

All CBC fats, whether in standard or specialised ranges, have been put to the test. We are glad to share with you our findings. If you have any queries or would like further details about fats, you are most welcome to contact our Sales Director. 'Phone CITy 6783 or write to him at the address below.

WHATEVER YOU MAKE—
A CBC quality fat exists to meet your needs.

Get your Fats and Facts from CBC

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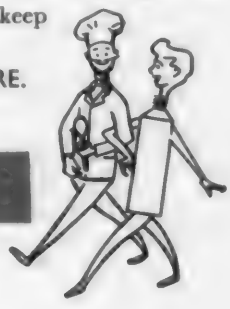
The well dressed food product

IS ALWAYS IN DEMAND

Collapsible metal tubes combine eye-appeal . . . utility . . . and novelty. They offer a tremendous sales impetus to whatever food product is first in its field with this new idea in food packaging. *That product could be yours.* Why not talk to H. G. Sanders about it?

Tubes for food packaging offer a variety of advantages—to the housewife and to you. They are handy and economical, providing an applicator as well as a pack. Contents last indefinitely, protected against drying out and contamination. Tubes are light yet strong, giving maximum contents for minimum bulk. Their initial cost, including cap, liner and printed-on label, is moderate; and quick automatic filling and closing, and reduced breakages and freightage charges all help keep down production costs.

Above all, TUBES SELL MORE.



SATURN SANDERS

SANDERS

FOOD PACKAGING IN TUBES

Technical advice and co-operation on any tube-packaging project freely available. Please write or telephone :

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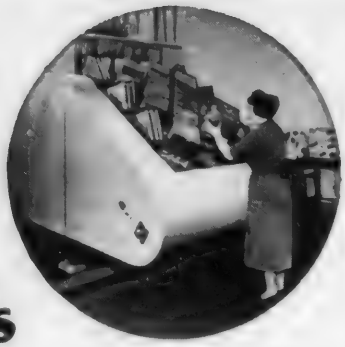
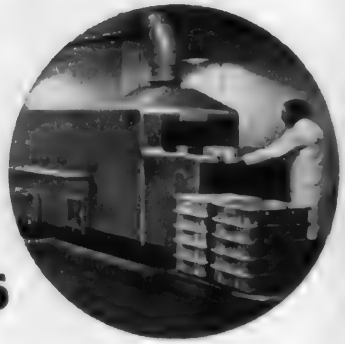
WASHING

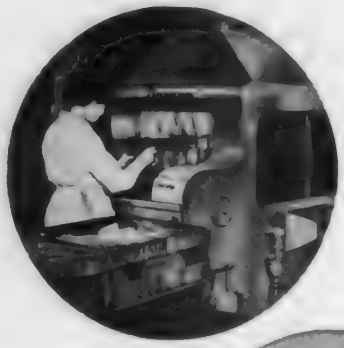
Whatever it is you wash or clean—tins, trays, cans, jars, bottles or the utensils used in the manufacture of food products, DAWSON washing machines provide the most economical and the most hygienic answer to this problem.
Dawson machines are capable of washing large quantities of articles at great speed. The washing process results in a standard of cleanliness which fully satisfies every Health regulation.
Dawson's long experience in the manufacture of washing plant ensures complete dependability of operation year after year.



BISCUIT TINS



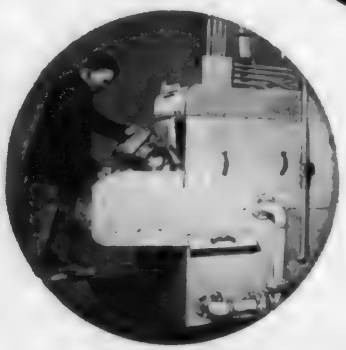
BAKERS TRAYS



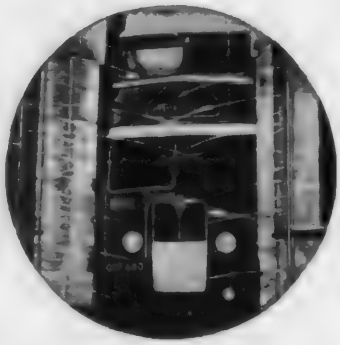
ALL JARS

ALL BOTTLES

DISHES



FISH BOXES



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Dawson

WASHING & DRYING PLANT

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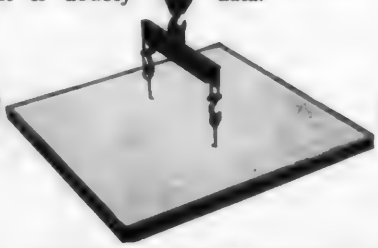
Our problem was to assemble heavy plant and material while our new extension was being built.
We solved it by laying the floor first—Stelcon steel-clad Rafts, the finest heavy duty floor I've struck in a lifetime of experience.
The whole operation was dead easy. We just laid a bed of sand 4" deep, evenly compacted over level topsoil; brought in our rafts and lowered them into position by mobile crane. And there was our floor, ready for immediate traffic.
Each raft weighs about one ton. It is doubly reinforced, bound with angle iron, and faced with the Stelcon steel-clad wearing surface.
We found that by laying the floor first, the remaining building work was speeded up; saving us 7% in overall cost.
What interests me, is that Stelcon Raft Floors have been in service for 18 years, without costing a penny in maintenance. That's quite a consideration.
Why don't *you* get in touch with Stelcon; ask for their illustrated booklet, it contains all the technical data.



Stelcon 'RAFT' FLOORS

STELCON (INDUSTRIAL FLOORS) LTD., CLIFFORDS INN, LONDON, E.C.4. TELEPHONE: CHAncery 9341

THE STEEL COMPANY OF WALES LEADS BRITAIN'S GROWING STEEL PRODUCTION

Velindre Works is now operating

The new works at Velindre, near Swansea, is built on a site of 48 acres. It began operating on July 10th and will eventually double the Company's production of cold-reduced tinplate.

Velindre is similar to the tinplate works at Trostre, which was completed in 1951. Trostre is already producing at a rate of more than 400,000 tons per annum. The equipment at Velindre will be of 95% British manufacture and will include electrolytic tinning lines capable of producing all weights up to 1 lb. and differential coatings. The combined resources of the Company's plants will include five electrolytic tinning lines, 16 hot-dipped tinning pots, with automatic inspection and stacking and the widest range of size, substance and temper.

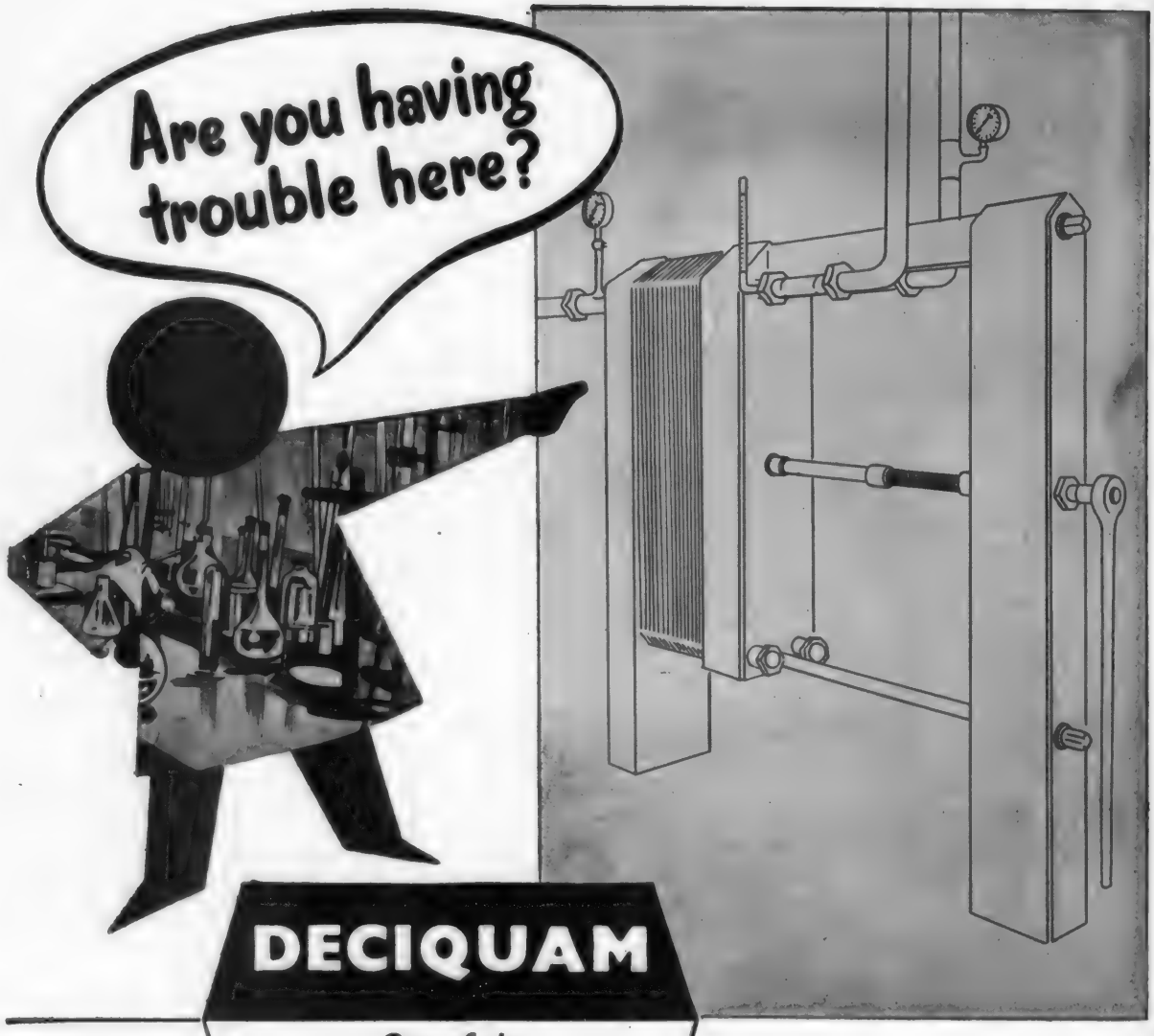
One of the new developments in steel technology planned for Velindre will be a continuous annealing plant. The first of its kind in Europe, it will speed production while maintaining traditional high standards of quality.

As the production of this plant increases, the necessity for further tinplate imports—which in 1955 totalled 80,000 tons—will disappear.

This latest addition to the plants operated by The Steel Company of Wales not only expands production but also increases the range of specifications available.

The Steel Company of Wales Ltd

Tinplate enquiries should be addressed to
The Tinplate Sales Manager, The Steel Company of Wales Limited, Carmarthen Road, Swansea, Glamorgan



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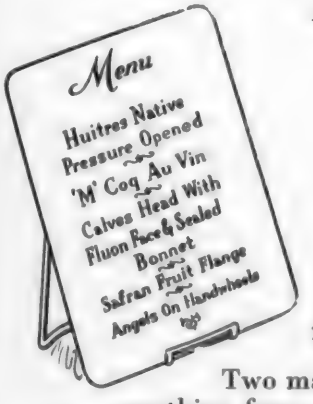
Thick or Clear, Sir?



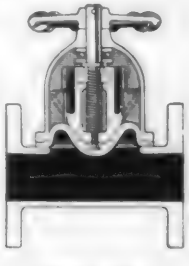
As varied as the human palate is the menu of industrial fluids. Appetite, though making heavy demands upon the Saunders Diaphragm Valve for handling both finished foodstuffs and the fluids involved in manufacture, is but one of the many claims upon a valve with a high sense of hygiene.

No mechanism of a Saunders Valve ever touches an edible fluid, nor can any offensive fluid ever penetrate to that mechanism, which means that the valve is allergic to nothing and is master of all the fluids that flow—and some that tend to stick.

Two main types are available: Type A which handles anything from Abrasives to Mayonnaise or from Mulligatawny to Zinc Sulphide; Type K with straight bore simplifies matters when you are serving Macaroni or Magmata, Milk Puddings or Colloidal Consommés.

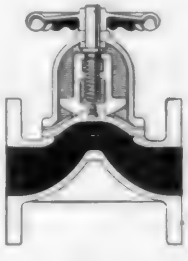
SAUNDERS DIAPHRAGM VALVES

From the great variety of Saunders Diaphragm Valve specifications, you will find the combination best suited to the handling of the majority of industrial fluids. The Handbook, 'List of Applications', explains this versatility.



TYPE 'K'

The straightest of straight bores allows maximum fluid flow and permits rodding through for the clearance of built-up deposits of not-so-fluid fluids.



TYPE 'A'

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Fruit bottling on a 'Motaveyor' conveyor (by courtesy of J. Mawdsley Ltd., Wigan)

Scandura conveyor in a fish canning factory (by courtesy of Fisher & Ludlow Ltd., Birmingham)

As the pioneers of P.V.C. covered conveyor belting British Belting & Asbestos have supplied their SCANDURA belting for many varied applications. Due to its resistance to contamination and its hygienic qualities SCANDURA has become the obvious choice for food conveyor belting. Its lasting qualities had already been proved in food factories two years before its first introduction in Britain's coal mines in 1948, and its fire resistant properties have brought a hitherto unknown safety margin where conveyor fire hazards originally existed. SCANDURA is available now, in varying widths and thicknesses to suit all applications.

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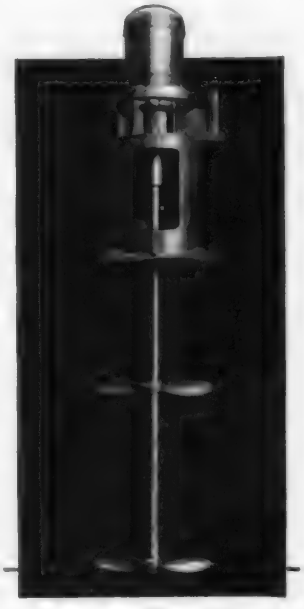
Type GA fluid mixer for medium speed mixing of semi-viscous fluids and where gentle agitation is required.

Type AD fluid agitator for high speed mixing of free-flowing solutions.



Type GVD permanently mounted geared fluid agitator for heavy duties.

To the Foodstuffs Industry we can supply a wide range of fluid agitating equipment for sugar syrups, sauces, soups, brine solutions for canning, essences, flavourings, aerated waters, marshmallow creams, etc.

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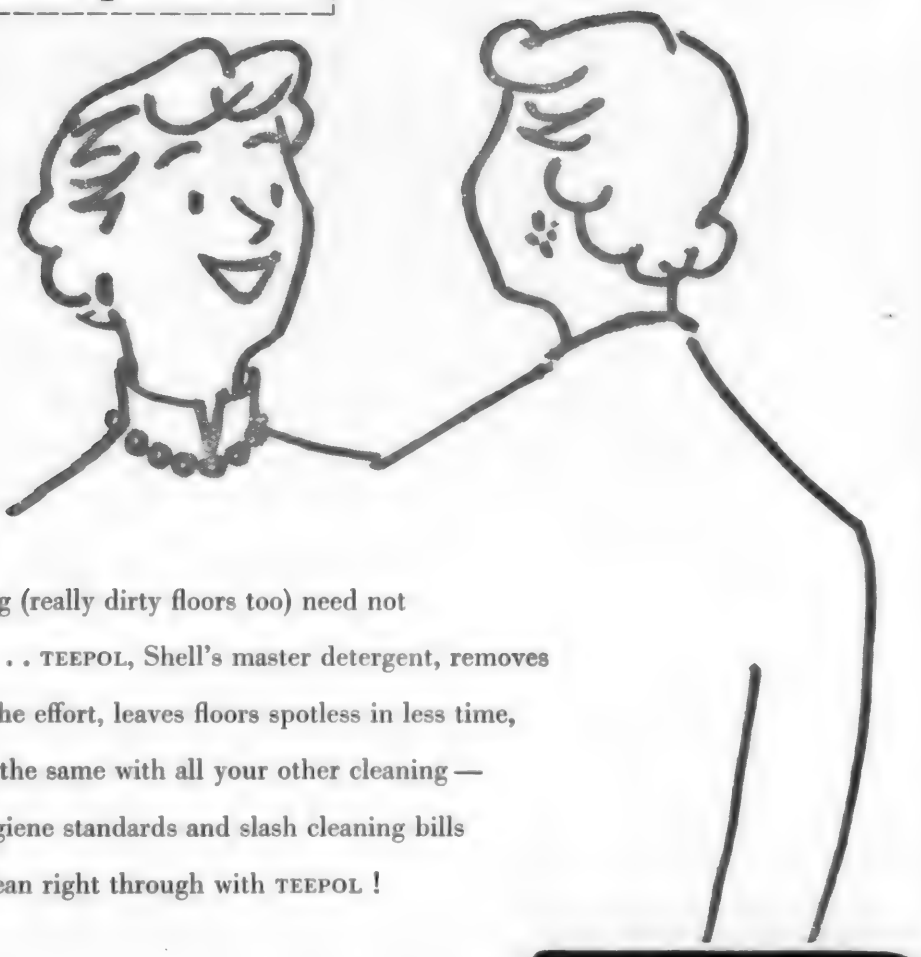

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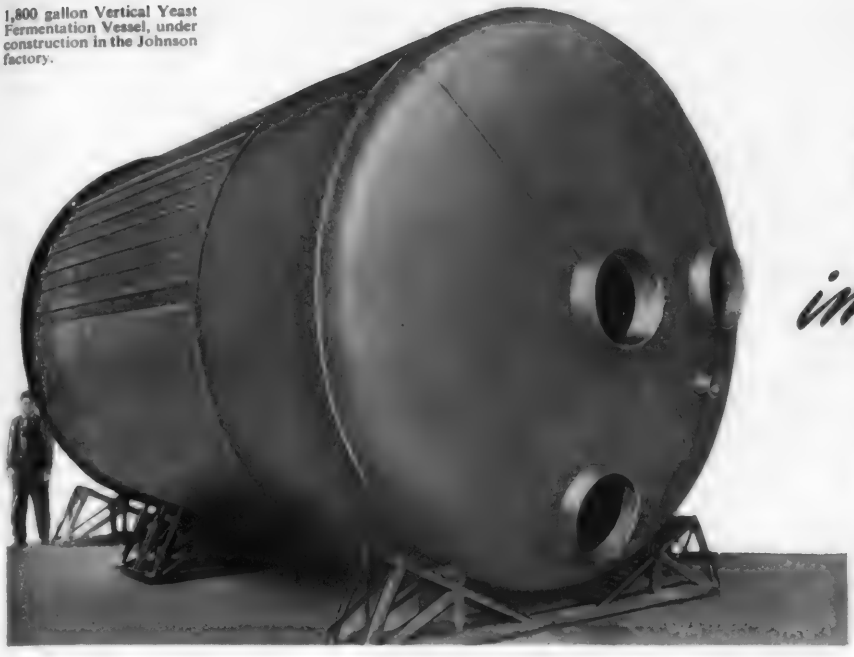

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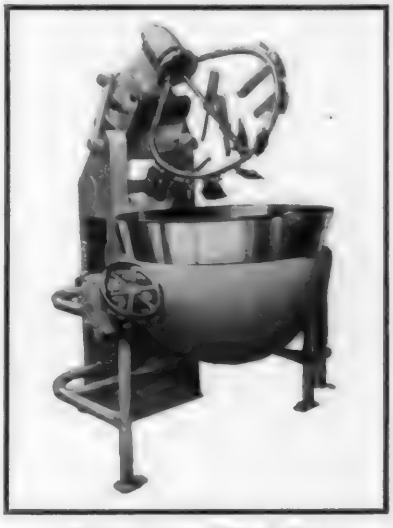

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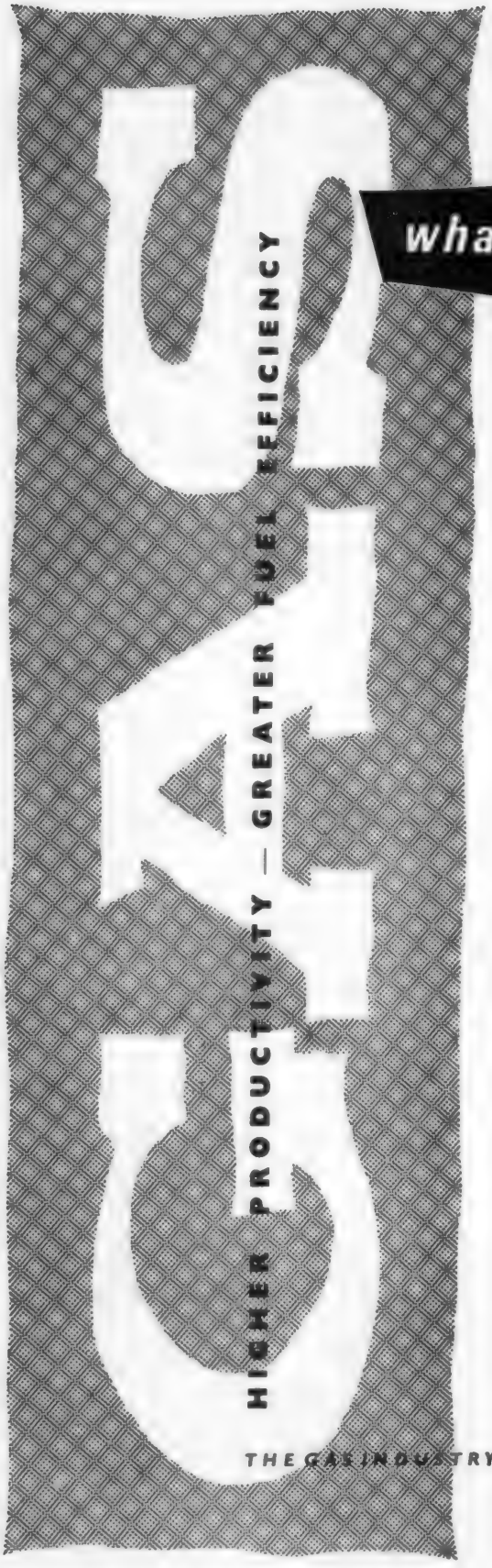

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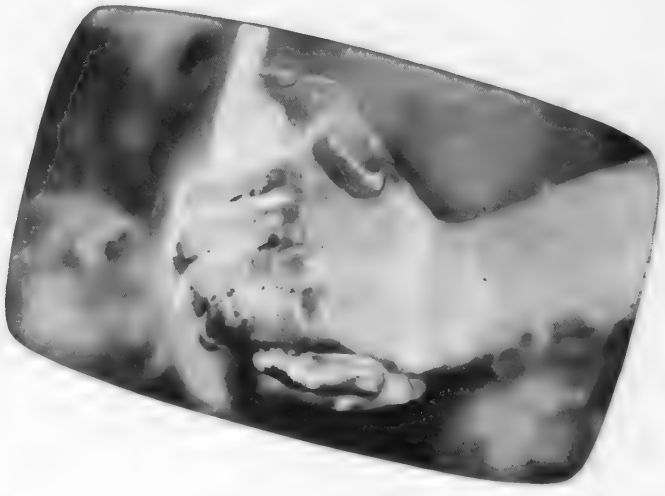

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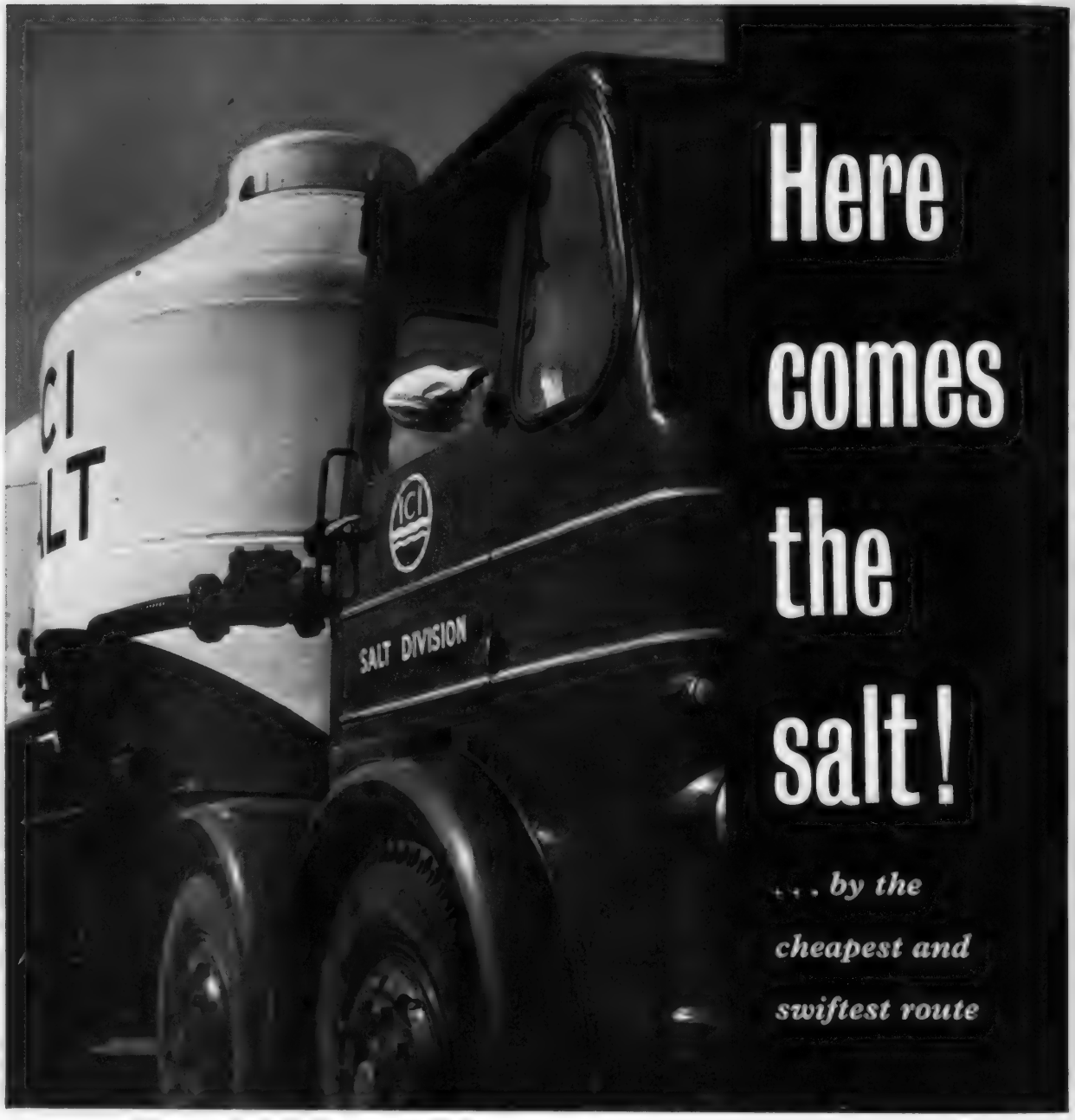

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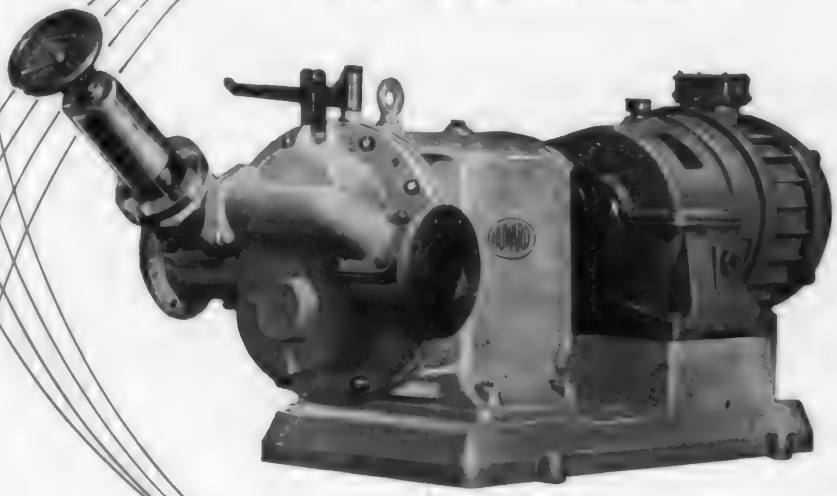

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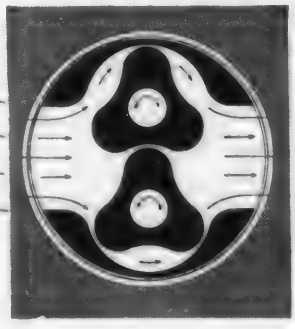

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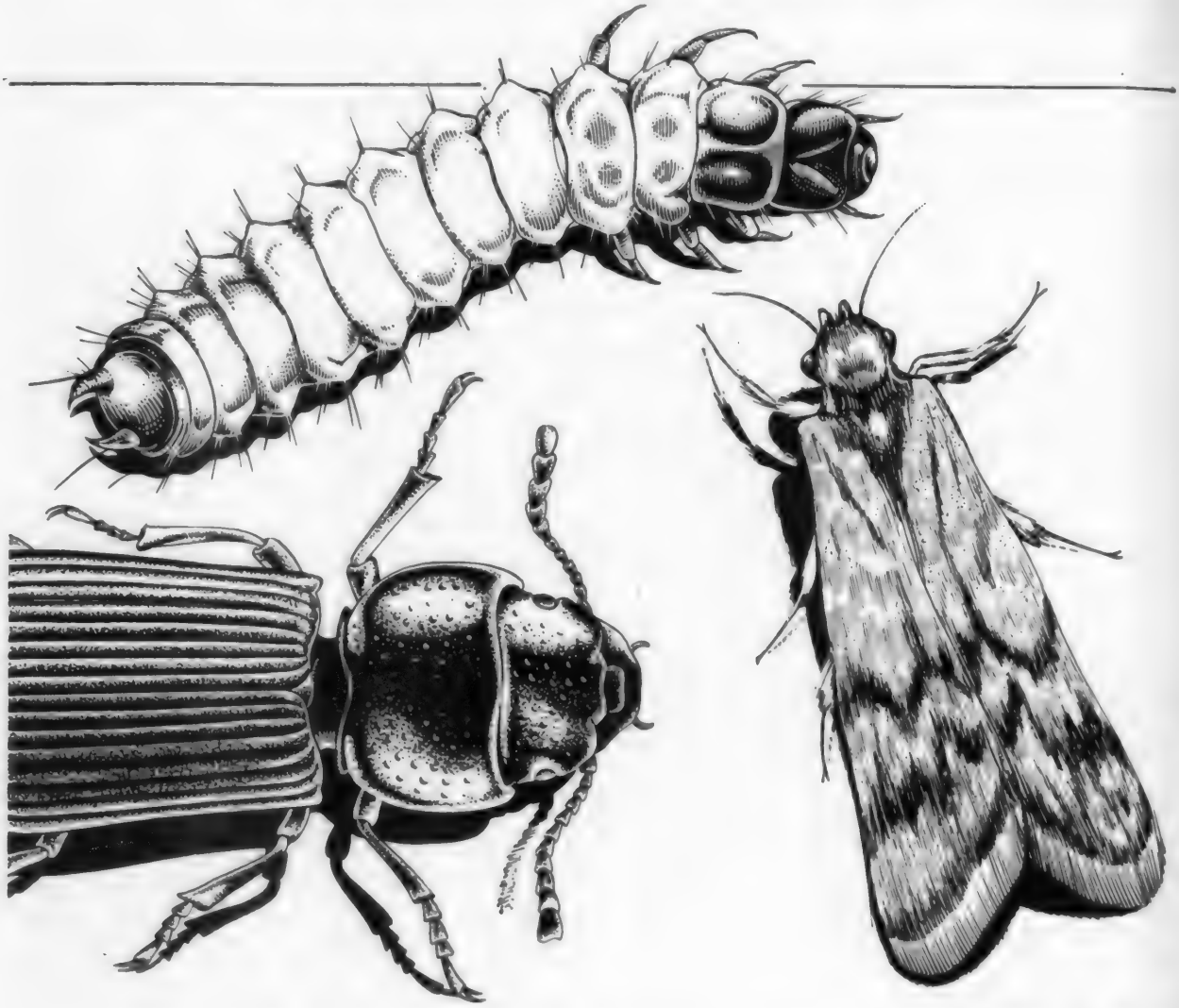

Insect life dies in the ENTOLETER. Eggs, larvae, pupae and fully-grown pests are shattered to destruction by powerful centrifugal force set up by a rotor speed of 2,900 r.p.m.

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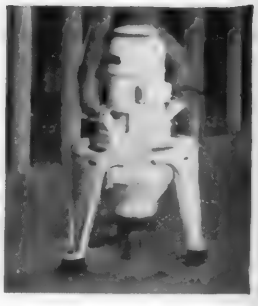

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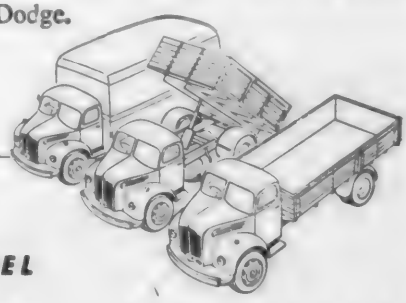

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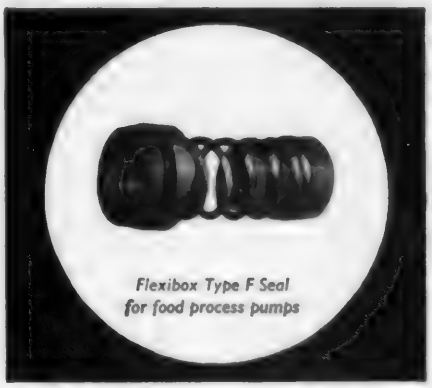

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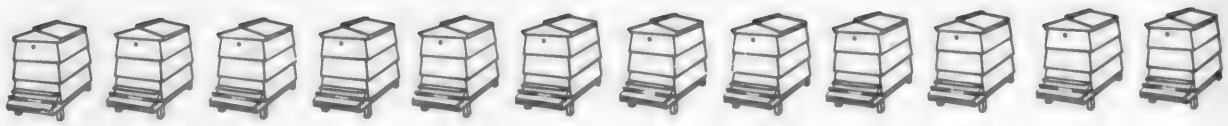

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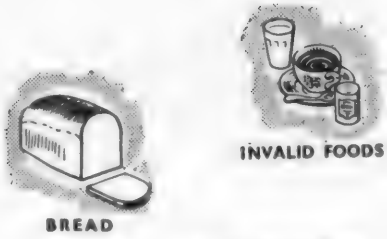

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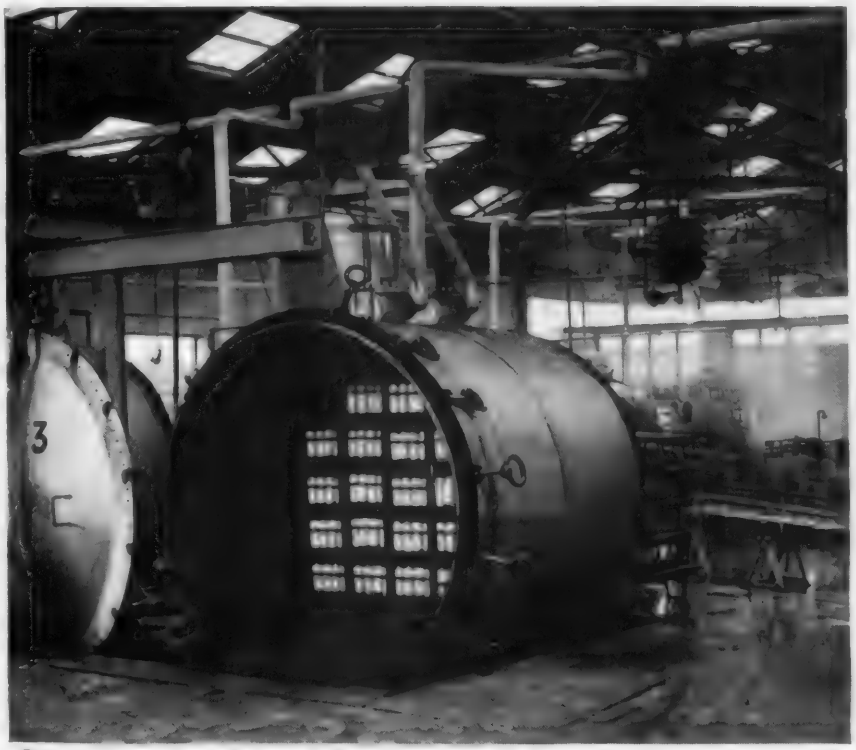

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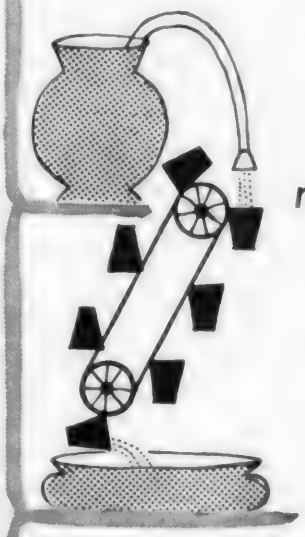

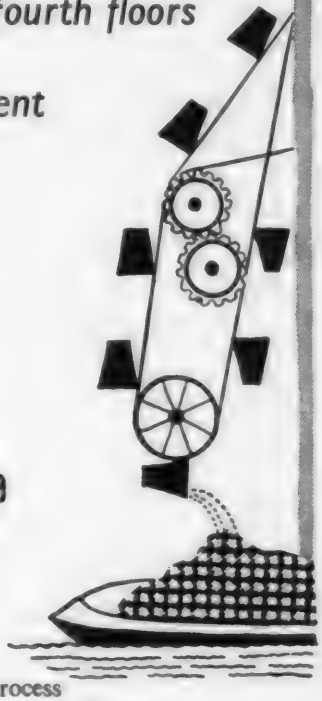

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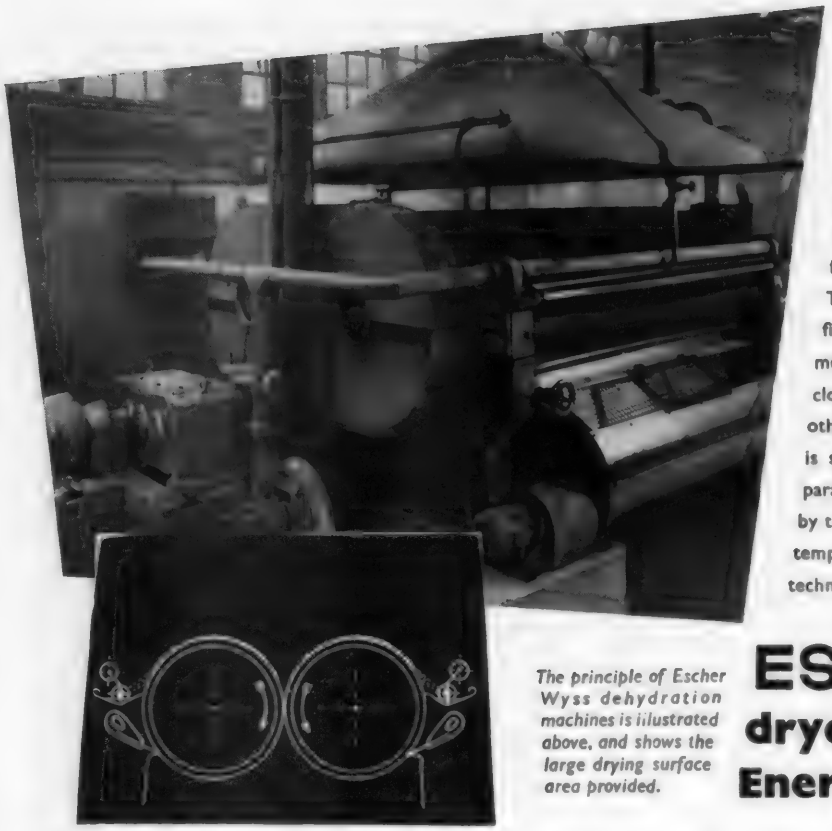

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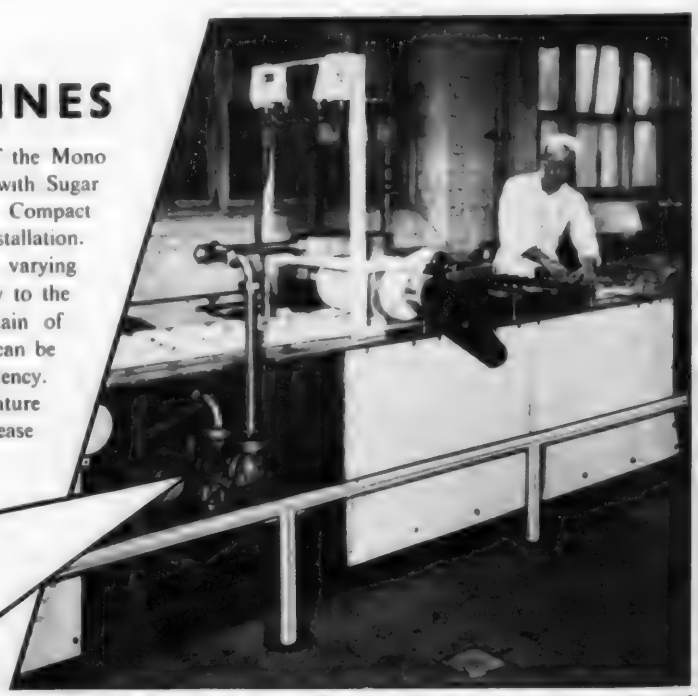

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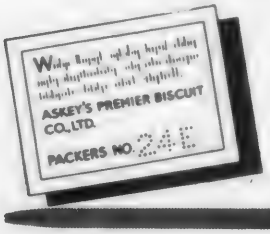

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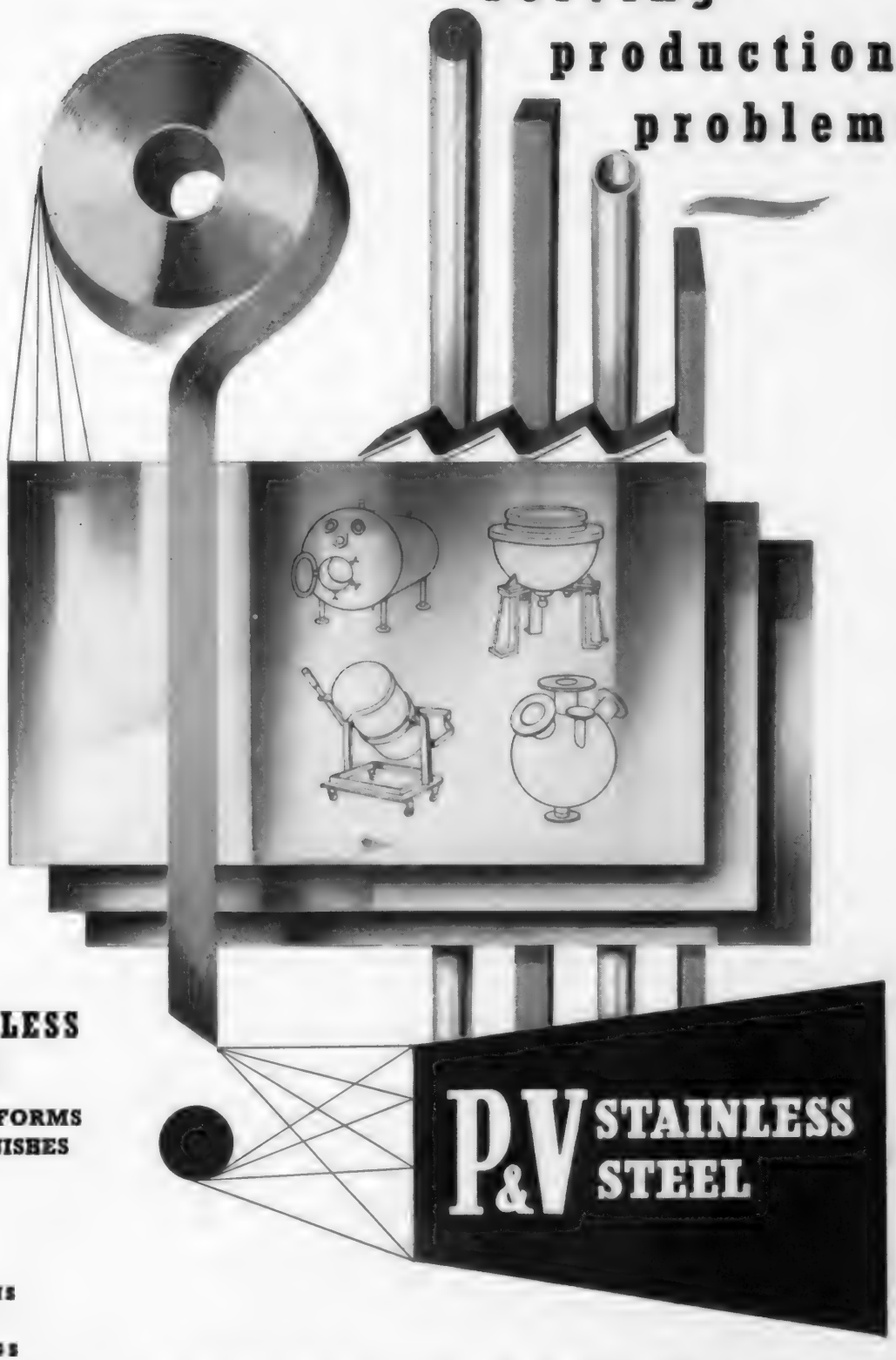

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LIMITED

FOOD MANUFACTURE

Vol. XXXI. No. 9 · Published Monthly · September 1, 1956

CONTENTS

Editorial - - - - - - - - - - 357

Sago Flour Dressing - - - - - - - 361

The Perishability of Food in Consumer Packs-1. *By C. Olin Ball* - - - - - - - 365

Handling and Processing Buffalo Milk - 368

The Scalding of Vegetables Before Dehydration. *By E. G. B. Gooding, M.A., M.I.Biol.* 369

Substitute Foods. *By D. S. Bhatia and G. S. Bains* - - - - - - - - - - 376

Automatic Control at Margarine Oil Refinery 381

Meat, Fish and F.I.O. - - - - - - 382

Oils and Fats: Today's Position and Tomorrow's Trends - - - - - - - 385

Advances in Food Technology - - - - 389

Machinery and Equipment - - - - - 391

News Digest - - - - - - - - - 394

Food News Overseas - - - - - - - 399

Packaging - - - - - - - - - 401

New Companies - - - - - - - - 402

Trade Marks - - - - - - - - 402

Information and Advice - - - - - - 403

Recent Patents - - - - - - - - 404

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FOOD MANUFACTURE

Vol. XXXI, No. 9 September 1, 1956

Matchbox myth

"MEAL in a matchbox" shrieked a headline in a national newspaper recently. "Synthetic food, as tasty and more nourishing than the real thing, yet so compact that a three-course meal goes in a matchbox, has been made in top secrecy by Government scientists," ran the first sentence. This remarkable achievement was attributed to Dr. J. M. Hay and his group at the Ministry of Agriculture's establishment in Aberdeen. The soup would be a tablet, the steak crystals and the potatoes powder, we were informed. And how was it done? "They had made for them the finest possible beef stew, mixing with it those flavours that most people like. . . . The stew was passed to the analysts. They "took it to pieces" chemically. Its value in nourishment was measured. The protein-starch balance was discovered. Even its flavours were analysed. Substances were found that could be used to replace accurately all the chemicals (*sic*) in the original."

An astounding story. The only trouble is that it is quite untrue. We have it on the best authority that the whole tale is grossly erroneous. Dr. Hay and his colleagues (who, incidentally, work at the Experimental Factory, not Torry as stated in the article) have not made any attempt to synthesise food. Of course, several constituents of food can be synthesised and certain synthetic foods are used therapeutically, but no one in Aberdeen knows of "matchbox meals" of the kind so circumstantially described. And no one there knows how the story was started. Another mis-statement in the newspaper article was that "big chemical industry groups" are backing the research.

Accustomed as we are to newspapers making mistakes when treading on the delicate ground of science reporting, it must be seldom that a story is printed which is wrong from start to finish. Without the embroidery of phrases like "synthetic food" and the implication that the whole business was a matter of making chemicals in test tubes, the story simply tells us that it is possible to dehydrate food. Nothing new there and, we suppose, unworthy of publication as such. With so much that is really new and significant in science to report, why must journalists titivate tired old stories?

Red light for polyoxyethylene

IN THE article on polyoxyethylene monostearate in our July issue, the authors were careful to point out that the question of whether it is permissible to use it in food manufacture has not been settled in this country. Officially it has neither been approved nor condemned.

From the U.S. comes news of experiments whose results must seriously be considered by those who must pass judgment on polyoxyethylene preparations. The results are decidedly unfavourable. Rats and hamsters fed with diets containing polyoxyethylene stearates and polyoxyethylene sorbitan monolaurate suffered a whole catalogue of ill-effects. Growth was retarded, adult size was decreased, food utilisation efficiency was impaired, water consumption in rats was increased, the animals suffered consistent diarrhœa, hamsters suffered hæmorrhage from the genito-urinary tract, mortality was increased and the animals had a generally unthrifty appearance.

These results led the experimenters—C. E. Poling, E. Eagle and E. E. Rice of Swift and Co., Chicago—to conclude "The harmful effects observed in animals fed polyoxyethylene-derived surface active agents at dietary levels as low as 5%, indicate that considerable caution should be exercised before such substances are used in foods for human consumption."

Admittedly there is a considerable margin between the level of 5% used in these trials and the 0·1% suggested as suitable for use in bread by our contributors in their article in the July issue. But even so it is impossible to have confidence in polyoxyethylene preparations in the face of this latest evidence. At the very least there is a long way to go before a final decision can be reached on these materials.

The obvious course is for other teams of experimenters to duplicate the Swift trials and no doubt this will be done in due course. The Swift results are the more noteworthy because in the past two years three important papers have appeared describing trials with rats and cats in which negative results were obtained.

Interested readers can read the Poling, Eagle and Rice papers in *Food Research*, 1956, **21** (3), p. 337.

Saving labour in a biscuit factory

TIME and labour has been saved by a comparatively simple re-organisation of jobs at the Reading factory of Serpells, Ltd., biscuit manufacturers. Before re-organisation, sacks of sugar and flour were transferred from lorries to the top floor by mechanical elevators and then wheeled directly to the storage area. A transit area has now been established at the elevator head where the stacks are held until they can be conveniently taken to the storage area. Three men do this job, compared to seven required before.

On the same floor a mill used for granulating sugar has been moved closer to a grinding machine for broken biscuits so that one man can control both machines.

The task of mixing syrups and glucose—previously a part-time job for one worker—has been transferred to the fats storage room and the work cycles staggered so that both operations can be handled by two workers instead of three.

A new method of making up and dispatching orders from the stock-room has cut the staff from 14 to 5. Under the old system each order was made up and dispatched separately. The stock-room has now been re-arranged so that a stillage load of up to eight separate orders can be sent to the loading bay. Each stillage load is accompanied by a "construction sheet" listing the items of the orders in the load. Similar items are listed in the same column and the columns follow the exact sequence as used in the stacking plan of the stock-room. A stillage load of orders from some 50 varieties of biscuits can be made up without covering the same ground twice. The loaded stillage is then taken to the loading bay directly below. At this point a roller track carries the stillages from the lift to the forward end of the bay. Stacking inside the vans is facilitated by an extendable roller table.

Most men's meat

TWO years of unrationed meat has confirmed that tenderness is perhaps the most important quality demanded by the consumer. In their annual report the Food Investigation Organisation note that small joints of fresh or chilled beef are the most popular and that high prices are being paid for the better cuts for grilling, roasting or frying.

It is recognised that with our present beef supplies, one-third of which consists of cow-beef, more attention must be paid to conditioning meat to make it more tender and the F.I.O. has again co-operated with the Australian Commonwealth Scientific and Industrial Research Organisation in investigating methods of obtaining more tender lean meat of high quality.

Surveys in America show that tenderness, flavour, juiciness and adequate fat content (in that order) are the qualities looked for in meat. While the F.I.O. has been investigating tenderness by pre-slaughter treatment and modifications in post-slaughter practice, the efficacy of tenderising agents is being studied by the American Meat Institute Foundation, and these studies are described by C. Edith Weir in their Circular No. 20 under the somewhat despairing title "The riddle of tender meat."

Mechanical tenderising is successful for certain types of steak but for physical reasons cannot be used where there is bone. Salt and other curing agents and acids such as vinegar also increase tenderness, but this depends upon the extent to which they penetrate the meat so that usually only a surface effect is achieved. More recently the proteolytic enzymes, such as papain from papaya fruit, bromelain and bromelin from pineapple, and rhosyme from a fungus, have been very successful. They hydrolyse the proteins and act upon the connective tissue of meat. The biggest problem in their use is in achieving even distribution of the enzymes through the meat being treated. If they are concentrated in some areas the meat is completely digested and becomes mushy.

Milk powder for baking

MILK POWDER with some of the properties of egg albumen has been produced by the Dairy Research Section of the Commonwealth Scientific and Industrial Research Organisation in Australia. The product has been produced under commercial conditions in batches of several tons and is now being sold for use by the pastry trade and for household use.

For use in sponge cakes the milk powder was further improved and adapted to large-scale production by replacing the carbonate mixture in the second stage with phosphate buffer solution. Baking trials with wholesale cake-manufacturing equipment are said to have given very satisfactory results.

Several aspects of the processes used in making these special milk powders are of scientific interest. For example, the Maillard reaction between casein and lactose has been found to take place during the treatment of concentrated skim milk with lime, and to be detrimental to the quality of the meringue powder. Viscosity curves for both calcium hydroxide and sodium hexametaphosphate treatment of milk concentrate pass through a maximum and the role of lactose in these reactions is being investigated.

The section has also investigated the stability of vitamin A in non-fat milk powder. The dietetic value of non-fat milk solids both in Australia and in the Asiatic countries is little inferior to that of whole milk. The main difference is in the vitamin A content, and if this deficiency were corrected non-fat milk solids would become an even more valuable

food at an extremely low price. Synthetic vitamin A is readily available—the problem is to add it to the milk powder in such a way that it will not be lost by oxidation during storage. By using hydrogenated coconut oil as a vehicle and adding edible antioxidants a very stable condition of the vitamin A has been achieved: after 6 months at 40°C., more than 90% of the vitamin remains. The section is now applying the methods in commercial scale tests, according to its annual report for 1954-55.

Mushrooms from sawdust

THE production of mushrooms from sawdust was described to the American Chemical Society by Dr. S. S. Block recently.

The achievement is an adaptation of a primitive Oriental practice. The Japanese used to inject mushroom fungus into a hole punched into a forest log, plug up the hole, and wait 18 months for the mushrooms called "Shii-take" to grow out. Experiments by Dr. Block and his co-worker, George Tsao, indicate that 500 lb. of fresh mushrooms can be grown on a ton of ordinary dry sawdust, supplemented with oatmeal, in about two weeks.

One species, *Pleurotus ostreatus*, popularly called the oyster mushroom for its white, shell-like appearance, has been employed extensively in the experiments. Its appearance and texture is like the "Shii-take" mushroom but its flavour is between that of the *Agaricus campestris* (the traditional mushroom) and the Japanese mushroom. The cap is firmer than the commercial American or European mushroom and it grows open rather than in "buttons," even when small. The *Agaricus campestris* mushroom loses its texture and juice when frozen, whereas the firmer *Pleurotus ostreatus* mushroom may be frozen and thawed without harm. The stems are tough and would be useful only when ground up in flavourings.

The mushrooms appear most rapidly when gumwood sawdust is used, but most of the work has been done with autoclaved pine sawdust. The yields obtained in the small experimental batches were equivalent to 500 lb. of fresh mushrooms per ton of dry sawdust. Larger yields are anticipated as the optimum conditions for cultivation are established. Unlike the *Agaricus campestris* mushroom, which must be cultivated at temperatures between 50 and 60°F., the *Pleurotus ostreatus* mushroom has been consistently grown in a constant temperature room at 78°F. It will not fruit at 90°F. or at 50°F.. For best growth of the mushrooms the sawdust should be supplemented with nutrients, *e.g.* 5% of oatmeal. It is possible that cheaper mineral fertilisers may be used and such experiments are under way. Results indicate also that too great a concentration of nutrients retards mushroom formations.

A world food reserve

THE SUGGESTION that a World Food Reserve should be established was first made by the Government of Costa Rica at a general assembly of the United Nations. Many different views were expressed during the debate which followed but almost everyone agreed that food distribution problems are still serious and that the FAO should be asked to prepare "a factual and comprehensive report on what has been and is being done." This has now been published under the title "Functions of a World Food Reserve —Scope and Limitations" (H.M.S.O., 5s. net).

Malnutrition, says the report, is caused by poverty for which the only cure is economic development. It will not be possible to cure the world's chronic malnutrition through the establishment of a world food reserve which operates on a self-financing basis and which acts as a world buffer pool at the same time, simply because malnutrition is a *chronic* problem, due to lack of purchasing power. The resources of a World Food Reserve would soon be depleted unless it was constantly being replenished or unless the food could be paid for. An International Relief Fund would be a more practical proposal than an actual physical stock of food.

Another proposed function of the Reserve would be to counteract excessive price fluctuations by the establishment of separate international buffer stocks. The idea is essentially a sound one, states the report. The very concept of buffer stocks is sheer common sense and it is applied in many walks of life, both physical and economic. Even so a number of very important technical, economic and political problems would have to be solved before the scheme could be made practicable. Technically, only about a dozen food commodities accounting for about 10% of world trade could be regarded as eligible for international buffer stock operations, and for many of these there are likely to be considerable technical obstacles. Economically and politically the problems are even more difficult.

In a world of convertible currencies, the term "surplus" if it is to be meaningful as a basis for action, must mean surplus at a price. It follows then that a World Food Capital Fund, *i.e.* an international fund composed of surplus food stocks, would have more practical value than a World Food Reserve, and the main purpose of this fund would have to be seen in the assistance it could provide to economic development in under-developed countries.

It would be extremely difficult to combine the non-self-liquidating functions of a World Food Capital Fund with the very different functions of self-financing world buffer stocks for stabilisation purposes. However, by helping to turn structural surpluses into a vehicle for accelerated balanced economic develop-

ment in accordance with internationally agreed safeguards and principles of surplus disposal, the Fund could go some way towards lessening the danger of unco-ordinated stock release decisions and the tensions caused by conflicting national policies which are among the most serious obstacles to international buffer stocks. Moreover, the co-ordination necessary between the administration of the Fund and that of separate stabilisation reserves would contribute to the key objectives of stability and progress, not only in the economic sectors concerned but in the world as a whole. The difficulties in the way of such world-wide co-ordinated endeavours are great but once they are faced and clearly understood, they may not be insuperable.

Fresher fish

"EXCESSIVE APPREHENSION" about the potential risk of residual antibiotics from fish preserved in "antibiotic ice" should not stand in the way of progress, urged some delegates to the International Meeting of Fish Processing Technologists at Rotterdam recently. Calling for a "common-sense" approach, they opined that the time had come to conduct large scale experiments by responsible institutes in the use of, for example, aureomycin treated ice on trawlers engaged in long-distance fishing. This could be done, they say, with the consent of the public health authorities in the countries concerned and the results would provide a very clear guide as to future action.

A more cautious approach was made by C. Engel of the Central Institute for Nutrition Research in Utrecht. Dealing with the "Public Health Aspects of the Use of Antibiotics in Foods," he said that "sensitisation of future patients" and the induction of resistance in strains of bacteria are important problems which must be carefully considered before permission is granted to use antibiotics for keeping food fresh. If the residual level of the antibiotic in fish or other fresh food is negligible some, but not all, of the objections to its use will be eliminated. The best answer would be to use non-medical antibiotics which do not give rise to cross-resistance in antibiotics used in the human body.

Experiments of the kind called for have already been made on a pilot scale by the Torry Research Station from the research trawler *Sir William Hardy*, and the results of these experiments were described to the conference by Dr. J. M. Shewan. He stated that haddock and cod had been kept in an edible condition for 7 to 10 days longer than is possible by conventional methods.

"Excessive" and "common-sense" are relative terms and can be used by both those who wish to postpone the use of antibiotics in food until their ultimate effect has been carefully assessed and those who wish to introduce them to commercial fishing as soon as possible. There can be no doubt, however, that the possibility of dangerous effects from antibiotic residues should be thoroughly explored before their use is sanctioned. Neither should antibiotics be used as a substitute for hygiene. The first requirement for landing fish in a fresher condition is more hygienic handling of the catch on board fishing vessels.

Sandwich story

THERE has been a vigorous outburst in the newspapers about the high price of sandwiches in London. "The same old cheese and tomato job costs 1s. 9d., three times the value of the ingredients," complains one correspondent. Another inveighs against smoked salmon at 4s. 6d. a time and sarcastically adds that the profits should be used to erect a statue to the Earl of Sandwich in Leicester Square. There are many versions of the story of how this earl (1718-92) gave his name to the sandwich. Certainly he was a great gambler and certainly it is likely that he did indeed call for a slice of meat between two hunks of bread to stay his hunger during a particularly long sojourn at the gaming table. There are the usual claims for precedence, of course, going right back to the inevitable Romans who were fond of sandwiches which they called by the plebeian-sounding name of *offula*.

Whatever the origin of its name, this snack is so very British that we had better look to its improvement if our foreign visitors are to be pleasantly sustained when a major meal is an hour or so away. "A cup of chah and a sandwich" is a traditional British answer to the appetite on picnics, while camping, or when waiting for the 4.15 on the cold expanses of Muddleton Junction. Thoughts of British Railways bring to mind not so much the moderate improvement noticeable at railway buffets, but the way in which French and American railway caterers always seem to be so far ahead. French Railways have set up "gastronomic buffets" at some stations, and we read of one American station where the chicken sandwich was shaped like an aeroplane and served on a pastel-shaded plate.

In sandwiches, as in other everyday things, variety is the spice of life, provided it is limited to those "cheese and almond," "cheese and celery," "anchovy and parsley," or even one of those New England sandwiches composed of "sausage meat, chicken, mushroom and egg yolk." Provided the price and quality are right we do not ask for something exceptional, like the Gold Coast natives who delight in sandwiches with hair cream as filling; or even caviare, which to our soldiers on the Black Sea in World War I was nothing more than "this 'ere adjectival fish jam"!

SAGO FLOUR DRESSING

"Food Manufacture" visits a new factory in Liverpool embodying 46 years of specialised experience

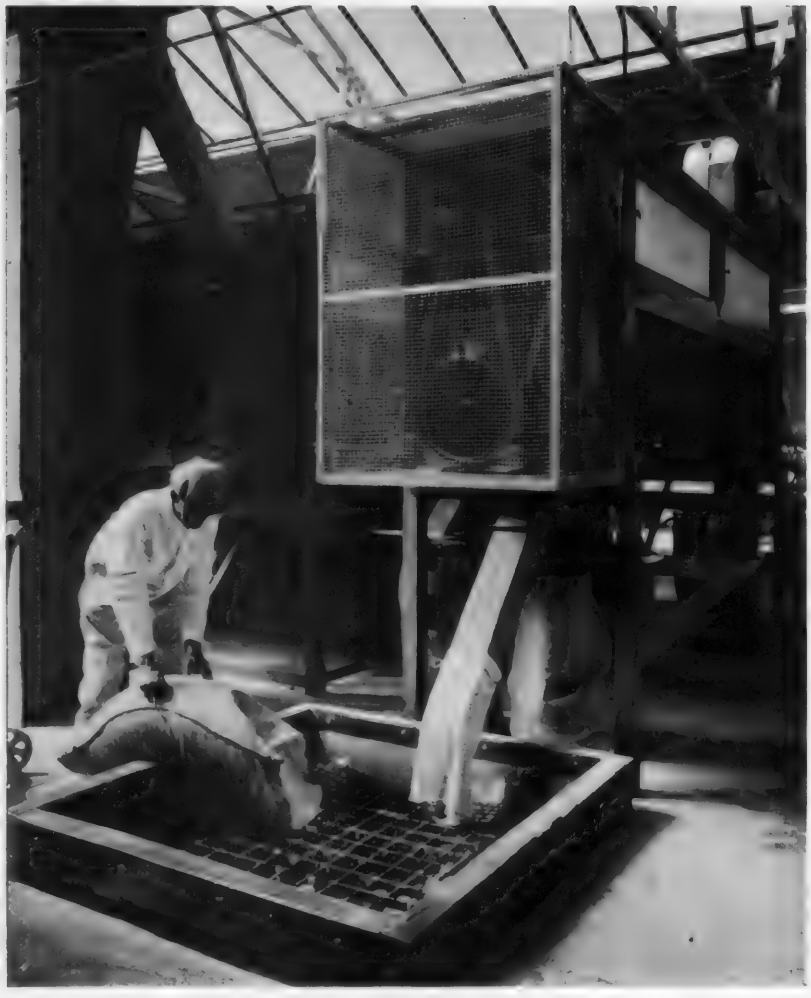
STARCH is present in a greater or lesser degree in all forms of vegetable life and is produced commercially from several sources. Wheat and potatoes are perhaps the best-known sources, producing cornflour and farina, which come mainly from America and the Continent respectively.

There is another important source which is not perhaps so well known, namely, the sago palm. We are all familiar with sago pudding, the rather glutinous sweet prepared from seed or pearl sago. The prime product of the sago palm, however, is sago flour, from which pearl and seed sago are prepared.

The principal sago-producing palm is *Metroxylon Sagus* or *Sagus Lævus*, which flourishes chiefly in Malaya and Sarawak. The trunks are cut into convenient lengths of about 2-3 ft. long and split lengthwise. The basic operation consists of grinding the very loose pith which forms the centre of the logs into particles and kneading them with water. The milky starch suspension is filtered through mats of palm leaf stems and run into wooden troughs, where the starch settles out. Washing and filtration are repeated several times. These operations are usually done on the spot. At the local factories, the starch is re-washed and ground, filtered through cloth and dehydrated, the moist starch being spread out on mats to dry and bleach in the sun. Sometimes crude kilns are used.

ABOVE. Four fine dressing machines fitted with silk mesh. The control panel governing all machines in the plant is on the right.

The sago flour is then packed into twill bags ready for shipment. Most of it is shipped from Singapore. Liverpool is the principal receiving port for sago flour in this country and handles about 20,000 tons annually. While substantial quantities are used in the textile industry, the greater part is used in



Tipping the unrefined sago flour into the sunken hopper. One of the two pre-dressers is behind the hopper. Roughage can be returned for processing through the pipe leading into the hopper or it can be bagged separately.

various forms of food manufacture.

Sago flour can be used for practically any purpose for which starch is required. It is cheaper than other starches and because of its Empire origin is exempt from import duty on production of a certificate of origin. Users are therefore able to save money and support Empire trade without cost to themselves.

It gives transparent pastes of good jelly strength and a higher viscosity and strength compared with other starches. It is used considerably in the manufacture of glucose and its characteristics render it less liable to "cracking" when used in the preparation of lemon curd. Some users consider that it brings out the flavour of other ingredients to a marked degree and on this account it has advantages in the preparation of gravy powders, batter mixtures, rusk, soup powders, mayonnaise, pickles, vegetarian preparations, table powders, cocktail savouries, sweets and confectionery, dragees and jelly confections, etc.

Owing to its nature and method of preparation, sago flour is not suitable for use in its imported state as it contains fragments of bark, fibre and other impurities which have to be removed in order to make it fit for use. This is done by dressing, which not only removes all foreign materials but also presents the flour in a form suitable for eating.

James Brown and Co. are one of the very few firms specialising in this work, for which purpose they have recently installed the most modern equipment in their newly built factory at Aintree. The site was chosen because it is near to the docks, where the raw sago flour arrives, and the principal road and rail exits from Liverpool.

The plant and its operations

The raw flour is emptied into a hopper sunk into the floor of the factory, whence it is carried by worm conveyor into the grabs of an enclosed elevator which carries it up to the "pre-dressers." These consist of revolving drums covered with coarse wire mesh through which the flour is driven by centrifugal force while the separated impurities are ejected by separate channels from the plant. The pre-dressed flour falls into another worm conveyor from whence it is elevated to the top of the plant where it is driven along a horizontal channel to the feed valves of four fine-dressing machines. The feed valves, one for each dressing machine, are each made up of 8 segments rotated by plungers. Each segment picks up about 3 lb. of flour and delivers it to its dressing machine. The rate of feed can be varied by adjusting the setting of the plungers. The flour is passed automatically to each valve, the overall feed being adjusted so that the input balances the offtake. The fine dressers function in the same way as the pre-dressers, but instead of coarse wire they are covered with fine silk mesh. The roughage or offal from the fine dressers is wormed back to a separate machine, as it still contains a high proportion of flour, and this recovered flour can be fed back into the main plant or sacked off separately as required. The fine dressed flour is next conveyed by inclined worm for weighing and sacking. The weighing machine is simply a very accurate scale incorporating a trip mechanism which stops the flow of flour into the sack at 4 lb. under weight, the remainder flowing in under the manual control of the operator. The bags are then automatically sewn and sent by electro-hydraulic conveyors to their storage bays.

Every machine in the plant is

powered by a separate motor which is controlled by a switch on a central panel designed by one of the partners in the firm. While it was originally planned to have the whole plant fully automatic, the partners decided that in view of the size of the installation it would be better to have separate control of each machine and they find themselves very satisfied with this arrangement. All the machines have trip mechanism so that if one cuts out, its feed cuts out too and the flour is diverted into an overflow. Worm conveyors are fitted with safety flaps so that there is no danger of flour choking the passages. The company also has an installation for general milling.

Fifty years' experience

In planning the flow James Brown and Co. have been guided by their long experience which extends over nearly half a century. The business was founded about 1910 when James Brown, the father of the two brothers who run the business in partnership, began dressing sago flour in their Parr Street Mill, until recently the headquarters of the firm. This situation had been chosen for its proximity to the South Docks where at that time all the sago-carrying ships from the East arrived. When in 1927 these ships began to discharge at the newly opened Gladstone Docks, premises adjacent to the discharging berths were rented, thus enabling delivery to be made direct from ships to the processing plant.

The outbreak of war in 1939 destroyed these facilities. All imports of sago were stopped and the Gladstone Dock premises closed down. Many of the staff, including Mr. John Brown, joined the services and were overseas for the duration of the war. The remaining staff moved back to Parr Street and for the next six years acted as sub-contractors working on war contracts for the larger millers.

During this time they were called upon to refine, dress and blend a very wide variety of materials ranging from dehydrated vegetables to herbal preparations. Their tasks were not restricted to blending powdered preparations and a certain amount of work was done by them on de-stalking herbs. At one time they were requested to process a quantity of hops on behalf of a high-ranking Army officer who decided to relieve the monotony of desert warfare by brewing his own beer!

The end of the war did not mean a return to normal conditions. The Ministry of Food was the sole importer of sago until 1950 when in that year controls were lifted and the company resumed operations at Gladstone Dock. They found that dock charges had risen so steeply that it was uneconomic to continue their tenancy. At the same time it was evident that much of the plant and equipment would have to be renewed, and accordingly the brothers planned a completely new factory. A site was procured on an industrial estate near Aintree and building commenced in 1954. The main building, besides accommodating the plant, has a storage capacity of some 800/1,000 tons. There are also boiler house, office block, with laboratory, cloakrooms and welfare facilities. Space for future expansion is available.

Three main considerations have influenced the design of the factory —cleanliness, hygiene and good lighting. The visitor's first impression is of spaciousness. The unprocessed flour is brought in by lorries and unloaded under cover, each consignment in its separate location. Similarly, outgoing lorries are loaded under cover with the processed flour.

Bagging and sack-sewing. The man on the right is controlling the flow of sago flour by referring to the indicator just above his head.

Separate installation for general milling purposes.

Management-staff relationships are good. Most of the staff have been in the firm's service many years and the key men are skilled craftsmen. This is a "family" business in every sense and the management welcome visitors who wish to see something of modern sago flour dressing.

SOME SUPPLIERS OF PLANT AND EQUIPMENT

Pre-dressers; fine dressers: *Henry Simon, Ltd.*

Worm conveyors; bucket elevators: *Christy and Norris, Ltd.*

Weighing machine: *Richard Simon, Ltd.*

Bag sewing machine: *Medway (Paper (Sachs), Ltd.*

Electro-hydraulic elevators: *Fourways (Engineers), Ltd.*

The New Food and Drugs Act

THE coming into force of the Food and Drugs Act, 1955, on January 1 of this year rendered obsolete many of our standard reference books on food legislation. A book* which includes in the relatively small compass of 200 pages the text of the Act and a summary of the changes brought about by recent legislation, and which provides a convenient source of reference to the considerable volume of case law on foods and drugs, will be welcome.

Since the Food and Drugs Act, 1938, came into force a number of acts, orders and regulations have been promulgated, designed to protect the public still further against the sale of adulterated or injurious foods and drugs, misdescription in labels or advertisements, or the contamination of food in the course of preparation, distribution or sale. A considerable proportion of this heterogeneous body of food law was consolidated in the Food and Drugs (Amendment) Act, 1954, which also came into force on January 1 of this year to be repealed and replaced on the same day by the more comprehensive Food and Drugs Act, 1955. The main body of this Act was further reinforced by the Food Hygiene Regulations, 1955, a measure which closely affects all those engaged in the manufacture, packaging or sale of food. The Act contains 137 sections and 12 schedules. The table of repeals and replacements which relates the sections of the new Act to earlier enactments occupies over four pages, is a valuable feature of this work, and illustrates the complexity of the task facing the compilers.

This book devotes 21 pages to a summary of the 1955 Act, drawing particular attention to changes in the law consequent upon the new Act. This is followed by the text of the Act with a wealth of notes. Of necessity, in a volume of this size, the notes are condensed and consist of the salient points briefly stated, with a reference to the appropriate case or statute. The non-legal reader who has not "Halsbury's Statutes," "The All-England Law Reports," or other sources of reference readily available may find his thirst for information titillated but not satisfied by this brevity, and may find that the style of annotation used in "Bell" more suited to his needs, but the mass of information concentrated within these pages would have occupied a very much larger volume had not the greatest economy in words been observed.

The need for some authoritative but concise guide to the present state of food and drugs law is clear, and this book should be of value to all those in the food industry, as well as to those whose duty it is to ensure that the law is observed.

F. A. LYNE.

* *The Food and Drugs Act*, 1955. By John A. O'Keefe and Robert Schless. Butterworth. Pp. x+216, incl. index. 30s. net.

The first comprehensive guide to methods of invoicing ever issued in this country is published by the British Institute of Management. The book, ***Invoicing Methods***, has been prepared under the guidance of a special committee set up by the Institute jointly with the Office Management Association and inaugurates a new B.I.M. series to be devoted to office management. It outlines in practical form all current methods of invoicing procedure ranging from the simplest manual to those involving the use of an electronic computer. Organisations supplying information include manufacturers of confectionery, pharmaceutical and engineering products and many others. The book is obtainable from the B.I.M., at 8, Hill Street, London, W.1., price 21s.

The Perishability of Food in Consumer Packs—1

By C. Olin Ball

(*Rutgers University, New Brunswick, New Jersey*)

All packaged foods deteriorate during storage, to an extent and at a rate depending upon various conditions. In this comprehensive survey, Dr. Ball discusses the types of spoilage associated with these conditions and expounds the arguments in favour of what he calls "the universal preventive of perishability in foods"—low temperature storage.

CHANGES in the quality of foods manifest themselves in (*a*) appearance, including colour and texture, and (*b*) flavour, including odour. The changes are produced by—

(1) direct action by micro-organisms,

(2) enzyme accelerated chemical reaction,

(3) chemical reaction independent of micro-organisms or enzymes,

(4) physical changes which include desiccation, sugaring, and migration of fat due to melting, and

(5) direct action by insects.

The changes with which we are concerned are those which take place between the time of closing the container after filling and the time of opening it for removal of the contents.

ACTION BY MICRO-ORGANISMS

Deterioration from direct microbial action is usually more easily appraised than that from enzyme action or from chemical action independent of enzymes or micro-organisms. Thus, this type of spoilage, although very serious, can be covered in comparatively few words.

Evidences of micro-organic spoilage are (1) generation of gas, (2) production of distasteful or harmful substances, such as acid, hydrogen sulphide, skatole, or toxic substances, (3) accumulation of visible clusters of the micro-organisms, such as mould spores and yeasts.

Sterilised foods

In these foods spoilage by micro-organisms can occur either if the process was inadequate to sterilise the food or if micro-organisms gain entrance to the food after the completion of the process. Hermetic containers are needed for this type of food, which means that they must be rigid and strong enough to retain their shape, and impervious to gas under any differential between internal and external pressure which may occur during and after sterilising. Failure to meet any of these requirements may result in leakage of sufficient magnitude to permit the entrance of micro-organisms to the food. Improper fabrication of container materials or of container seams may also cause such leakage.

Some "hermetic" containers are not actually hermetic, but can still exclude micro-organisms. These containers permit the entrance of air, but the passage of air is more like a diffusion process than a flow through an opening. The sealing medium of the container is usually the offender in such cases. This acts as a filter, removing micro-organisms from the air. This phenomenon has been observed in both metal and glass containers. While it does not lead to spoilage by micro-organisms, it can be responsible for other types of spoilage, which will be discussed later.

Pasteurised foods

These products will undergo microbial spoilage after storage periods, the lengths of which depend upon (1) the number of micro-organisms that survive the pasteurisation process, (2) the contamination with micro-organisms that occurs after the pasteurisation process, (3) the characteristics of the product as a culture medium, and (4) the temperature at which the packaged product is held. Milk, for example, is one of the finest of culture media, and its storage life is extended beyond one or two days only by keeping the survival rate and subsequent contamination low and the storage temperature low. Salad dressing, on the other hand, is a poor culture medium and, ordinarily, if the survival after pasteurisation is very low, will stand up for weeks at room temperature unless contamination with some prolific micro-organism occurs after pasteurisation. Contamination with yeast from handling equipment or from unclean containers has caused serious spoilage in salad dressing.

Products which cannot be contaminated after pasteurisation because they are pasteurised in the can are whole hams, canned chocolate nut roll (a U.S. army ration product) and canned brown bread. This is largely because they are poor culture media.

Frozen foods

In frozen foods, a part of the micro-organisms capable of spoiling the food are destroyed during the freezing process and in storage. However, many remain viable, and whenever the temperature of the food permits micro-organisms to grow, spoilage develops. Spoilage, due to either bacteria or yeasts, may develop slowly at −5°C. (23°F.), and the rate of growth increases as the temperature becomes higher. Species of *Cladosporium* and *Sporotrichum* have been known to grow at −6·5°C. Thus, spoilage due to micro-organisms may occur in food while it is still frozen. The types of containers used have little to do with the occurrence of this spoilage. A temperature of −10°C. is reported to prevent the growth of micro-organisms in meat.

Another cause of micro-organic deterioration in frozen foods is low

rate of removal of heat from a large mass of product during freezing—in other words, slow freezing. In packages of consumer size, loss of quality from this cause is unlikely to be substantial; therefore, a mention of its possibility will suffice for our purpose.

Frozen foods, after thawing, spoil rapidly—even at temperatures near the freezing point. Such foods should be consumed or cooked within a few hours after thawing. If the food accidentally thaws in storage, not only microbial spoilage but also all other types of spoilage to which the food is subject are likely to render the food unfit for use before it can be refrozen. The food may even become toxic. It has been reported that the blanching of vegetables increases the susceptibility of the vegetables to bacterial degradation.

Dried and dehydrated foods

Dehydrated foods and dried fruits contain dormant viable micro-organisms which are just waiting for an opportunity to grow and produce spoilage. This opportunity arises if the food acquires sufficient moisture to bring its moisture content up to 20 or 25% and if the salt, sugar, or acid content is not excessive. Such a high moisture condition may occur in either of the two following circumstances: (1) inadequate removal of moisture during the preparation of the foods for packaginging, (2) use of moisture-permeable packages with storage under unfavourable conditions moisture-wise.

Dried fruits and some dehydrated foods are likely to acquire sufficient moisture to permit growth of micro-organisms, particularly moulds, if stored at relative humidity of 55% or more unless protected by highly moisture-resistant packages. The moisture content which will start growth depends, of course, upon storage temperature.

ACTION BY ENZYMES

Deterioration through the action of enzymes is generally less easily appraised and is more extensive than deterioration due to microbial action. Enzyme action is practically universal in packaged foods in which the enzymes have not been inactivated, and enzyme action in these foods also is almost always undesirable. While it is not the cause of all the types of deterioration listed below, it is a cause of some manifestations of each type:

Colour changes, including browning and fading of natural colour.
Texture changes.
Nutritional changes.
Loss of natural flavour.
Rancidity.
Staling reaction.
Hay-like flavour.

Sterilised foods

Some of these types of deterioration occur regularly in heat sterilised packs. Since enzymes are not present in these foods, non-microbial deterioration in them is not due to enzymes and will be discussed in the next section. Therefore, in this discussion of deterioration due to enzymes, sterilised foods are not included. This is despite the fact that short high temperature heat treatment has been suspected of permitting subsequent reactivation of enzymes. Supporting evidence for this belief, however, is deficient.

Pasteurised foods

The flavour of some pasteurised foods may be impaired seriously by oxidative effects, which, it is presumed, are accelerated by enzyme action. One of the most serious of these effects, the oxidised, or so-called "cardboard" flavour of pasteurised milk, usually occurs only in the presence of dissolved metal, notably copper. Another example is rancidity in foods of the mayonnaise type.

Frozen foods

Most commercially frozen vegetables are blanched during their preparation for freezing to destroy the enzymes. Fruits are not blanched because blanched fruit is cooked fruit and therefore closely resembles regularly canned fruit. Except for fruits carrying anthocyan pigments, which deteriorate in sterilised foods held at room temperature more rapidly than in frozen foods during storage, frozen blanched fruit enjoys very little quality advantage over the same fruits canned by the most advanced techniques. The quality advantage, even for fruits carrying anthocyan pigments, would be slight over the canned products if the latter were stored at 32-35°F. because, in the absence of enzymes and bacteria, deterioration is almost as effectively retarded at 35°F. as at −10°F., in so far as commercial significance is concerned.

Most vegetables, if not blanched to destroy the enzymes in their preparation for freezing, undergo enzyme action comparatively soon after going into storage. In its various aspects, this action is thought to produce (1) fat deterioration, resulting in rancidity, loss of nutritive value, possibly staleness, and perhaps the production of toxic substances, (2) colour changes, constituting browning, loss of chlorophyll, and loss of red pigments, and (3) vitamin loss. The destruction of carotene by lipoxidase has been demonstrated.

Frozen fruits suffer colour changes and loss of vitamins similarly to unblanched frozen vegetables. Marked changes in texture, particularly those that are produced by changes in pectin molecules, also occur. In some fruits, for example, blueberries, a woody texture may develop.

Frozen fish, exposed to oxygen, lose their natural flavour and colour and darken early in the storage period. Since the action is so rapid, enzymes probably play a part in it. Rancidity and loss of tenderness develop later.

Both texture and flavour of frozen, non-sterilised, evaporated milk deteriorates during storage of as long as 3 months at any temperature above −10°F. These effects are reported to be largely obviated if the original milk is heated at 170°F. for 20 min. before evaporation.

In frozen citrus concentrates, cloud loss and gelation are import-

ant types of enzyme-promoted deterioration. The type of container appears to have no effect on the development of this spoilage. Very short heat processes of the juice at less than boiling temperature prevent cloud loss and gelation by inactivating the causative enzyme, which is said to be pectinesterase.

The most serious enzyme-induced deterioration in frozen noncured meat is fat decomposition. The rate of development of rancidity is affected, of course, by the temperature of storage. It is affected also by the type of package used for the meat, but there is some question as to whether this is an effect on enzyme action in the production of free fatty acids or is an effect on the development of oxidative rancidity. Taste tests by panel have indicated the development of off-flavour to the point of unacceptability in pork after storage for as short a period as 8 weeks at 10°F. In most of the commonly used types of packages, however, off-flavours develop less rapidly than in the instances just referred to. At 10°F., pork may be of acceptable quality for as long as 6 months.

Prepackaged meat

Enzyme action can have both good and bad effects on prepackaged fresh meat. It is not known whether enzymes play an important part in the chemistry of the haem pigments, on which the colour of meat depends. It seems to be established that bacterial action influences the haem reactions—sometimes beneficially, sometimes detrimentally. If enzymes have a role here, it, likewise, is probably sometimes beneficial and sometimes detrimental to colour. Texture effects of independent enzyme action are generally desirable.

As in the case of fresh meat, little is known about enzyme action in prepackaged table-ready (cured, cooked) meat. Since enzymes cannot definitely be incriminated in this quality impairment which plays the foremost role in rendering these products unacceptable, further discussion of fresh and cured meats will be deferred to the section on chemical changes occuring independently of enzymes.

COLD STORAGE FOR 3,700 TONS

Believed to be the biggest of its type outside the U.S.A., the new cold store at the Great Yarmouth (Norfolk) factory of Birds Eye Foods Ltd., is capable of holding 2,500 tons and is to be extended to accommodate a total of 3,700 tons. The store's internal dimensions are height, 18 ft. 3 in., length 236 ft., width, 58½ ft. The store is designed for fully palletised operating, an advance on the present method of man-handling stock which is in operation at most cold stores throughout the U.K. The clearance height underneath the coils is 17 ft. 9 in. and loads are stacked four pallets high which is a maximum stack height of 17 ft. The store is equipped with two non-refrigerated but vapour-proof air locks which prevent the penetration of moist air from outside passing into the internal chamber so that the deposit of frost on the cooling coils and on door fittings is greatly reduced. A thermostatically controlled heating mattress beneath the floor maintains the ground temperature at 39°F., and gives protection against frost heave. The refrigeration circuit is of the fully flooded ammonia-type feeding evaporator coils on the ceiling and walls. Insulation is of 10 in. of slab cork and dehydration of insulation is achieved by the incorporation of the "Minikay" system in the construction. This system provides a series of channels in the slab cork supplemented by ducting which connects to a circulating forced draught system. Air is forced through the channels and ducting and the moisture that this air contains is extracted by passing it over evaporator coils, the moisture being deposited in the form of frost which is subsequently thawed out and drawn off as water. This prevents the build-up of ice in the insulation, such a build-up being impossible to prevent even with the most rigid standard of vapour sealing when operating at temperatures as low as −20°F.

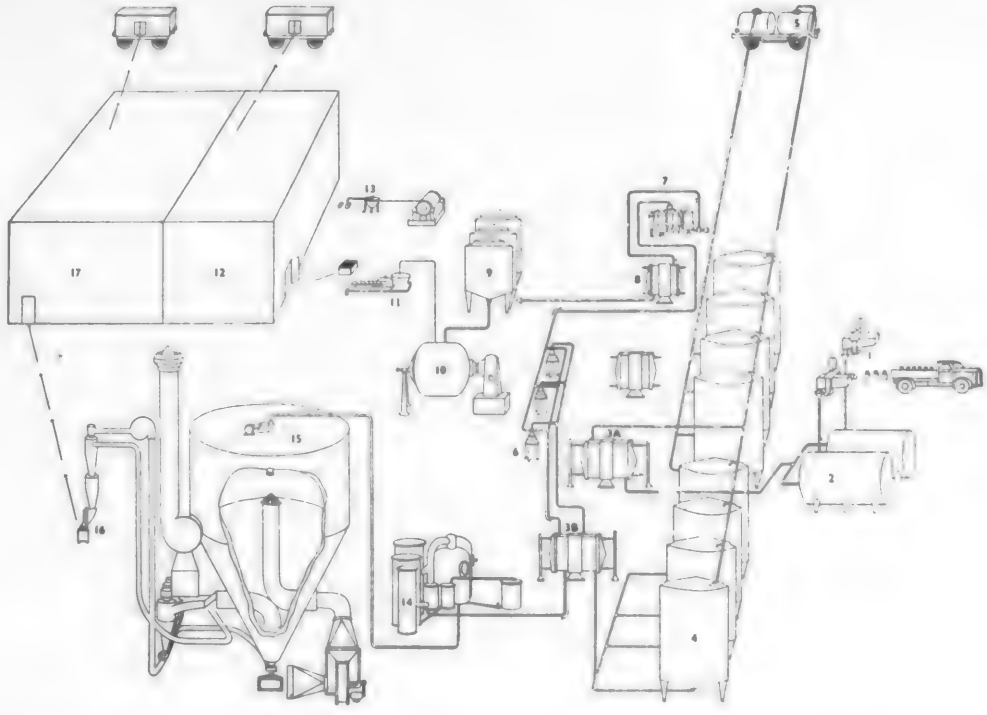
Fresh vegetables and fruits

Fresh vegetables and fruits suffer rapid degradation in both texture and flavour, as a result of enzyme action.

The composition of the gaseous atmosphere surrounding the vegetable or fruit units may affect the rate at which enzymic reactions take place or may even influence the nature of the reactions. This fact presupposes that the rate of deterioration of these products should be affected by the physical characteristics of the prepackaging material with which the products are enclosed. This also has been found to be true, but the information available about it is so meagre that one can scarcely go beyond a single variety of food in discussing the possible benefits of the application of the principle involved.

Fresh, untreated asparagus has been found to keep better, both flavourwise and texturewise, when packaged in cellulose acetate film than when not packaged, when packaged in any one of a number

(*Turn to p.* 388)



The new plant at Anand : 1 Scales; 2 raw milk tanks; 3A and B pasteurisers; 4 insulated milk tanks; 5 insulated rail tankers; 6 cream separators; 7 Vacreator; 8 cream coolers; 9 jacketed cream ripening vats; 10 butter churn; 11 butter wrapping machine; 12 cold store; 13 ghee pan; 14 milk condensing plant; 15 milk drying plant; 16 milk powder filling machine; 17 milk powder store.

Handling and Processing Buffalo Milk

THE arrival in India recently of nine milk tankers—part of an order for 20 that are being supplied from New Zealand—marks a further important step towards the completion of Bombay's big new milk processing and distribution scheme. Each having a capacity of 3,000 gallons and weighing 6½ tons empty, the tankers were constructed in Hamilton, North Island, and were sent under the Colombo Plan for use on rail and road to carry milk the 266 miles from a milk collecting centre of the Kaira District Co-operative Milk Producers' Union, Ltd., at Anand, to the Aarey Milk Colony in Bombay, where it will be re-pasteurised and bottled for local distribution.

The idea of the tankers came from a visit to India on a Colombo Plan mission by Prof. W. Riddet, director of the Dairy Research Institute at Palmerston, North Island.

More than one-third of the milk now distributed by the Bombay Government comes from the new modern plant at Anand, and before the tankers were delivered the milk from this depot was shipped to Bombay, after pasteurisation, in cans. The tankers have an inner stainless steel lining, 6 ft. in diameter and 18 ft. long. Surrounding this is a 6-in. packing of cork to act as an insulator against temperatures as high as 114°. This cork packing is encased in mild plate steel and an oregon case encloses the whole tank in an air "envelope" for further insulation. The outer tank has a diameter of 8 ft. 6in. and can easily be transported on the very wide gauge Indian railways. The rail chassis are being constructed in India, but the engines and chassis for the road tankers are being sent from New Zealand.

Of modern design, the new Anand depot collects milk produced by 23,000 buffaloes in 80 villages covered by the 58 affiliated societies of the Kaira Union spread over a radius of 14 miles around Anand. The milk from Anand costs Bombay 10 annas a seer compared with 13 annas 6 pies a seer paid for the remaining two-thirds of Bombay's supplies.

Designed to handle a maximum of 300,000 lb. of raw milk daily from the 20,000 contributing farmers, the Anand plant will pasteurise 150,000 lb. of this and ship it to Bombay. The remainder, up to 150,000 lb., will be stored in insulated milk tanks at the plant to be processed into three main products: butter, ghee and skimmed milk powder, and two by-products: casein and lactose.

The Scalding of Vegetables Before Dehydration

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Most vegetables require scalding before dehydration if a satisfactory product is to be obtained, but the loss of solutes associated with the water scalding technique usually practised in Britain may mean a substantial loss of yield of the dehydrated product. In this article experiments are described in which comparisons have been made, on the factory scale, between scalding in water and scalding in steam, and the effects of these processes on the yield, quality and storage life of the products.

ALTHOUGH scalding before dehydration was proposed by Graefer in 1780 and has been adopted by certain dehydrating firms in America since about 1917,[1] it was not universally adopted in this connection until the 1939-45 war. The importance of scalding in dehydration has frequently been discussed,[2, 3, 4, 5, 6] and although the possibility of substituting treatment with an enzyme inhibitor has been proposed,[7, 8, 9] the great majority of workers consider that, at present, there is no satisfactory alternative to the usual procedure of scalding in hot water or steam.

In British practice scalding before dehydration is usually carried out in water, most often in a continuous rotary machine, following the procedure normally adopted before canning or quick freezing. It is well known that scalding in water leads to loss of soluble nutrients and other solids from the vegetable, and this loss of solutes is a more serious problem to the dehydrator than to the canner, since to the former loss of solutes means loss of yield of the dried product. The possibility of reducing this loss by steam scalding has, therefore, received more attention by dehydrators than by canners (though steam scalding is now beginning to find favour in certain sections of the canning industry),[10] and steam scalding is the method generally preferred in the American dehydration industry.

In Britain there was a rapid expansion of the dehydration industry during the 1939-45 war, and since the canning industry had abundant experience of the use of water scalding this technique was adopted in preference to that of steam scalding, about which little was known at the time. The urgent need to bring factories into production did not allow prolonged research. Nevertheless, small scale experiments were continued,[11, 12, 13] and pilot scale experiments at this establishment have given results generally similar to those reported in the literature. The installation of a continuous steam scalder of large capacity has now allowed comparison of steam and water scalding on the factory scale, in which the objects have been to ascertain, so far as possible, the extent of loss of solutes occurring during scalding by each method, and to compare the processes with regard to the yield, quality, and the storage life of the products.

Table 1. Dehydrated Cabbage 1954-55 Season

LOSSES AND YIELDS RESULTING FROM WATER SCALDING AND STEAM SCALDING

Variety	*Run*	*Water scalding*			*Steam scalding*			*% Increase in yield due to steam scalding*
		Yield as % of trimmed cabbage	*% Recovery of dry matter*	*% Loss of dry matter*	*Yield as % of trimmed cabbage*	*% Recovery of dry matter*	*% Loss of dry matter*	
Early Ironside ...	140	5·73	76·1	23·9	6·48	88 9	11·1	11·4
	144	6·30	73·4	26·6	7·03	85·4	14·6	11·6
	146	6·92	74·3	25·7	7·78	87·2	12·8	11·0
Rearguard ...	150	8·72	82·0	18·0	9·23	90·5	9·5	5·8
Winningstadt ...	137	7·89	74·9	25·1	9·04	89·0	11·0	14·6
	152	7·80	73·0	27·0	9·10	89·3	10·7	16·7
Omega ...	163	7·97	68·9	31·1				
	162				9·81	82·2	17·8	23·1
Means		7·33	74·7	25·3	8·35	87·5	12·5	13·5

Table 2. Dehydrated Cabbage 1955-56 Season

INCREASE IN YIELD RESULTING FROM STEAM SCALDING

Variety	*Run*	*% Recovery of dry matter entering processing line*		*Increase in yield due to steam scalding*
		Steam scalding	*Water scalding*	
Greyhound	190	86·1	77·0	11·8
Copenhagen Market	197	86·7	75·6	14·2
Winningstadt	198	90·0	77·8	15·7

Equipment

The water scalder[14] and the steam scalder[15] used in these experiments have been described in FOOD MANUFACTURE.

Processing methods

The vegetable is trimmed and cut into strips or shreds. The "standard" dimensions for strips are 3/16 × 5/16 in. cross section, and the maximum thicknesses for shredded material is 3/16 in., and all material used in these experiments was cut to these dimensions unless otherwise stated. The cut material is washed, in the case of cabbage and potato, or passed without washing (carrot) to the

scalder. For water scalding the vegetable enters the rotating drum of the water scalder by a chute at the inlet end, and is carried through the scald liquor by a helical flange on the inner surface of the drum. The time of scalding is 2½-3 min., according to the vegetable being handled, and the temperature of the scald liquor is thermostatically controlled at approximately 210°F. Chemical dosing is combined with scalding, the solutions being trickled into the scalder.[14, 15, 16] Heating of the scalder is by steam injection, and the liquor capacity at normal working level is about 370 gal. Under experimental conditions the usual rate of throughput is about 1,100 lb. of vegetable per hr.

For steam scalding, the vegetable is weighed and spread on the trays on which it will subsequently be dried, and the trays are carried through the scalder on a conveyor belt, the period of scalding ranging from 2½-3 min. Chemical dosing is applied by sprays just inside the scalder at the exit end or just outside the exit end, *i.e.* immediately after scalding.

The subsequent dehydration is in a three-stage, cross flow drier, in which heated air at the appropriate temperatures is blown across the trays:[14, 15, 17] each "drier batch" consists of two trolleys holding 56 trays each.

Table 3. Dehydrated Cabbage

Losses During Water and Steam Scalding (expressed as Percentage of Dry Matter in Cabbage entering Scalder)

Water scalding		*Steam scalding*	
Run	*Loss*	*Run*	*Loss*
140	11·4	132	0·4
144	14·1	133	0·5
146	13·2	134	4·3
150	5·5	135	1·5
137	12·6	142	0·0
152	14·5	144	2·6
157	13·6	146	0·0
163	18·6	156	1·2
Mean	12·9		1·31

Experimental

General. In the dehydration process losses and yields may logically be expressed as percentages of the dry matter entering the processing line—*i.e.* entering the strippers or shredders, thus eliminating the variable losses due to peeling and trimming. It is therefore necessary to ascertain the dry matter content of the raw vegetable entering the processing line and that of the dehydrated product.

To minimise the difficulties and inaccuracies inseparable from reducing samples of large quantities of raw vegetables to the small quantities that can be handled in the laboratory, the following technique was adopted. In the place of one tray of scalded vegetable in each "drier batch" of 112 trays, was inserted a tray containing an accurately weighed quantity (approximately 2 kg.) of strips or shreds, taken directly after cutting, and covered with a wire mesh lid to ensure that no material could be blown off. The samples thus represented almost 1% of the total throughput. The contents of the trays were again weighed after drying, and the moisture content of the dried material determined by grinding the product to pass a 40 mesh sieve and heating subsamples in a vacuum oven for 5 hr. at 70°C. at a pressure of 1 mm. of mercury. The moisture content of the initial material could then be calculated. The moisture content of the scalded, dehydrated vegetable was also determined by the vacuum oven method.

Losses during scalding. When the water and steam scalding techniques are compared the other processes, cutting, washing and drying, are similar. A comparison of the yields of dehydrated product therefore gives a valid comparison of the losses resulting from the different methods of scalding, and most of the results in this paper have been obtained in this manner. It is more difficult to make direct measurements of loss

Table 4. Dehydrated Cabbage

Losses of Soluble Solids during Processing

Variety	*Date*	*Batch*	*Soluble solids content as % dry matter in— Raw cabbage*	*Dehydrated cabbage: Water scalded*	*Dehydrated cabbage: Steam scalded*	*% Loss of soluble solids: Water scalded*	*% Loss of soluble solids: Steam scalded*	*Loss of soluble solids % of dry matter initially present: Water scalded*	*Loss of soluble solids % of dry matter initially present: Steam scalded*
Greyhound	3.8.54	129/4	54		53		3·7		2·1
	12.8.54	133/4	56		55		3·9		2·2
Early Ironside	23.9.54	144/2	63	56		25·2		15·9	
		144/5	,,	57		22·2		14·0	
		144/10	,,	60		11·9		7·5	
		144/12	,,		62		4·1		2·6
	30.9.54	146/2	65	57		28·6		18·6	
		146/10	,,	57		28·6		18·6	
		146/12	,,		65		0·0		0·0
	6.10.54	147/1	,,	56		31·5		20·5	
Rearguard	21.10.54	150/1	57	49		27·5		15·7	
		150/10	,,	51		21·4		12·2	
		150/14	,,		57		0·0		0·0
		150/15	,,		56·5		1·9		1·1
Winningstadt	4.11.54	152/1	57	49		27·5		15·7	
		152/9	,,	56		4·0		2·3	
		152/11	,,		57		0·0		0·0
	11.11.54	153/1	60		59·5		1·8		1·1
	25.11.54	156/1	60	55		18·5		11·1	
		156/7	,,	57		11·7		7·0	
		156/9	,,		60		0·0		0·0
	16.12.54	157/1	59	54		18·4		10·9	
Omega	6.1.55	159/1	57		57		0·0		0·0
	20.1.55	161/1	51		50		3·9		2·0
	3.2.55	163/3	50	46		14·8		7·4	
		163/6	,,		49·5		2·0		1·0
Mean of all batches						20·8	1·8	12·7	1·0
Mean of last w/s batches						15·5		9·5	

during scalding, especially in the case of potato or cabbage, where the vegetable is washed after cutting; if the material is weighed before scalding the weight so obtained includes a variable quantity of adhering water. Further, there are mechanical losses during washing and during transfer from the washer to the scalder, and therefore weighing before washing is of little value, unless these losses can be measured. In a number of experiments attempts have been made to measure all the mechanical losses (by collection and weighing of waste at various points) and, by taking these into account, to calculate the loss of dry matter due to scalding, but only an approximation can be obtained in this way, nor does this differentiate between the scalding loss by leaching of solutes and the mechanical losses by escape of fragments through the drum of the water scalder (mechanical losses in steam scalding are almost zero).

A measure of the loss of dry matter during steam scalding might be obtained by eliminating washing and comparing the yields from the scalded and unscalded material. This technique is suspect, however, for vegetables which are normally washed before scalding, since during scalding there would be losses from cut cells that would ordinarily have taken place during washing. This effect is considerable in the case of potato, when a large amount of starch is removed in the washer, but probably only slight in the case of leafy vegetables where the cut surfaces are relatively small, and the figures for cabbage in Table 3 were obtained in this manner. With carrot, however, in which the strips are not normally washed before scalding, measurement of losses by this technique is possible, and in each factory run on this vegetable one tray in each 28 (*i.e.* one tray per half-trolley) was left unscalded; the figures so obtained were used in compiling Table 7.

It was not possible to use any similar technique for measuring leaching losses during water scalding, since there are mechanical losses through the perforations of the scalder drum; the loss resulting from the water scalding of cabbage and carrots shown in Tables 3 and 7 includes both leaching and mechanical losses.

Measurement of the soluble solids content of the raw vegetable and of the dehydrated product may be used to give an approximation of the leaching loss in root vegetables which are not normally washed before scalding, and, though with less accuracy, in leafy vegetables. Figures obtained in this way contribute to Tables 4 and 8.

Yield of dehydrated product. Yields were expressed both as the weight of dehydrated product obtained from 100 lb. of trimmed vegetable (as this is the figure of value to a food processor), and as percentage recovery of the dry matter entering the processing line. The following figures were obtained, usually for half-ton lots of raw vegetables.

(1) Weight of trimmed vegetable entering the processing line.

(2) Weight of dehydrated product.

(3) Dry matter content of raw vegetable.

(4) Dry matter content of dehydrated product.

Quality and storage life of products. The culinary quality of the products was assessed by taste panels, and, in the case of cabbage, the ascorbic acid content was determined by a modified in-

Table 5. Dehydrated Cabbage

ASCORBIC ACID IN RAW AND DEHYDRATED CABBAGE

(Expressed as mg./100 g. dry weight)

Variety	*Date*	*Batch*	*AA in raw cabbage*	*AA in dehydrated cabbage*		*% loss of AA*	
				Water scalded	*Steam scalded*	*Water scalded*	*Steam scalded*
Greyhound	3.8.54	129/1	660		458		30·5
	6.8.54	131/1	620		502		19·0
	17.8.54	134/1	652		506		22·0
	19.8.54	135/1	672		534		20·5
Winningstadt ...	24.8.54	137/1	840	580		31·0	
	,,	137/10	900		606		32·5
	,,	137/12	,,		652		27·7
	28.10.54	151/1	532		416		21·8
	,,	151/8	,,		424		20·4
	4.11.54	152/1	504	448		11·1	
	,,	152/11	,,		400		20·6
	11.11.54	153/3	393		336		14·5
	25.11.54	156/1	284	209		26·4	
	,,	156/7	,,	129		57·0	
	,,	156/10	,,		196		31·2
	16.12.54	157/1	350	265		24·4	
	,,	157/8	,,	147		58·0	
Early Ironside ...	2.9.54	138/1	854		647		24·3
	9.9.54	140/1	756	603		20·2	
	,,	140/9	,,	644		14·9	
	,,	140/10	,,		635		16·0
	14.9.54	141/1	784		555		16·5
	,,	141/4	,,		594		11·5
	30.9.54	146/10	588	448		20·5	
	,,	146/12	,,		432		23·2
	1.10.54	147/1	603	400		32·5	
Primo	21.9.54	143/2	888		622		30·0
Rearguard	14.10.54	149/1	644		452		14·2
	,,	149/9	,,		383		22·0
	21.10.54	150/1	579	486		15·5	
	,,	150/10	,,	440		24·3	
	,,	150/14	,,		444		24·0
	,,	150/15	,,		438		24·4
Omega	6.1.55	159/1	323		245		24·1
	20.1.55	161/1	311		211		32·2
	3.2.55	163/3	467	278		40·5	
	,,	163/8	,,	363		22·3	
Mean	...	...	...	...	...	28·5	22·7

dophenol technique based on that of Harris and Mapson.[18] The storage behaviour of the products was examined by keeping samples of similar moisture and sulphur dioxide contents at −5°C. (control), 18°C. and 37°C., subjecting them at suitable intervals to culinary tests and measurement of browning and ascorbic acid. Browning was determined either by the measurement of the optical density of the 66% ethanol extract or by the visual assessment method.[19]

Table 6. Dehydrated Cabbage

BROWNING AND ASCORBIC ACID CONTENTS OF STEAM AND WATER-SCALDED CABBAGE AFTER STORING FOR 6 MONTHS AT 37°C.

Variety	*Treatment*	*Moisture content*	*SO_2 content p.p.m.*	*Initially*		*After storage*	
				Browning (optical density of extract)	*Ascorbic acid content (mg./100 g.)*	*Browning (optical density of extract)*	*Ascorbic acid content (mg./100 g.)*
Early Ironside	Water scald	3·62	1755	0·315	404	0·535	190
	Steam scald	3·56	1523	0·282	393	0·471	214
Rearguard	Water scald	3·94	1268	0·321	407	0·437	105
	Steam scald	3·19	1804	0·325	416	0·382	312
Winning-stadt	Water scald	3·98	1882	0·339	376	0·540	91
	Steam scald	3·85	1952	0·288	398	0·528	182

Results

General. In water scalding, for all vegetables, there is a period during which the soluble solids content of the scald liquor rises until it reaches an equilibrium level, and the effect that this has on the yield of the product has been described in earlier papers.[14, 15] In all the comparisons of water and steam scalding given below, water scalding has been carried out at the highest practicable level of soluble solids concentration.

Similarly, it is to be expected that the volume of the sulphite spray in steam scalding will influence the loss by leaching. Preliminary experiments have shown that this effect is not great unless the differences in volume of spray are considerable, and in the present experiments the volume of spray ranged between the relatively narrow limits of 0·5 to 0·7 lb. spray per lb. vegetable.

The three vegetables studied show certain differences in response to the different scalding treatments and the results obtained are considered separately for each.

Table 7. Dehydrated Carrot

YIELDS AND LOSSES DURING PROCESSING

	Strip size (in.)	*Run*	*Yield as % of trimmed carrot (m.f.b.)*	*Yield as % of dry matter entering stripper*	*Losses during processing (As % of dry matter entering stripper)*	
					Total	*Scalding*
	1	2	3	4	5	6
(*a*) Water scalded (liquor with soluble solids content 3·5%)	$\frac{5}{16}\times\frac{5}{16}$	94	8·10	83·2	16·8	12·0
		98	8·52	89·7	10·3	5·4
		99	7·37	88·1	11·9	17·2
		171	9·67	85·4	16·6	12·8
	Mean			86·6	13·9	11·9
	$\frac{5}{32}\times\frac{5}{16}$	92	6·51	69·5	30·5	—
		94	7·82	80·3	19·7	14·9
		96	7·36	78·8	21·2	16·4
		98	7·14	75·2	24·8	20·9
	Mean			76·0	24·0	17·4
(*b*) Steam scalded	$\frac{5}{16}\times\frac{5}{16}$	158	8·62	83·6	16·4	13·3
		160	9·50	87·8	12·2	8·6
		162	10·20	88·5	11·5	8·2
		173	11·02	92·5	7·5	3·9
	Mean			88·1	11·9	8·5
	$\frac{5}{32}\times\frac{5}{16}$	162	10·21	88·6	11·4	6·1

Note: For each run the figures are means from 3 to 6 batches.

Table 8. Dehydrated Carrot

LOSSES OF SOLUBLE SOLIDS DURING PROCESSING

(Strips $\frac{5}{16}\times\frac{5}{16}$ in.)

Run	*Soluble solids content as % of dry matter*			*% Loss of soluble solids*		*Loss of soluble solids as % of dry matter originally present*	
	Raw carrot	*a*	*b*	*a*	*b*	*a*	*b*
2	66·4	63·0	64·9	13·8	6·3	9·2	4·3

(*a*) Scalded in liquor containing 3·4% soluble solids.
(*b*) Scalded in steam.

A. CABBAGE

Tests carried out during 1954 and 1955 ranged over a number of varieties: water scalding was in liquor containing 1·0-1·5% soluble solids: higher concentrations were not used as these had detrimental effects on the product (p. 8).

1. Losses and yields

(i) In the first season the total loss of dry matter averaged 25·3% when water scalding was used and 12·5% when steam scalding was used, with a mean increase in yield of 13·5%. In the next season the increase in yield resulting from steam scalding was 13·9% (Tables 1 and 2).

(ii) The loss in water scalding, calculated from the losses of dry matter, was 12·9%: that from steam scalding 1·3% (Table 3).

(iii) The leaching loss in water scalding, calculated from measurements of the soluble solids content of the raw and dehydrated vegetables, averaged 9·5% of the dry matter initially present (or 15·5% of the soluble solids initially present); corresponding figures for

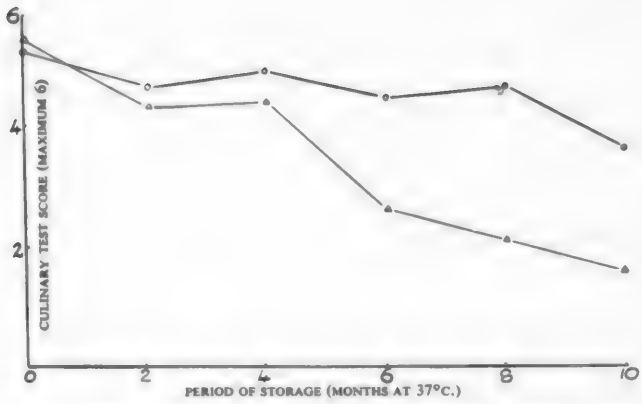

Fig. 1. Development of brown discoloration in dehydrated carrot stored at 37°C. : comparison of material scalded in steam and in water.

⊙ — ○ carrot strips with moisture content 5·5% and SO_2 content 544 p.p.m.: steam scalded.

Δ — ▲ carrot strips with moisture content 5·3% and SO_2 content 442 p.p.m.: scalded in water containing 2·41% soluble solids.

Culinary test score: 6=natural colour: 0=intense browning.

steam scalding were 1·0% and 1·8% (Table 4).

(iv) The loss of ascorbic acid during processing and dehydration averaged 28·5% when water scalding was employed and 22·7% when steam scalding was used (Table 5).

2. The quality of the product

Appearance. The colour of water scalded cabbage has generally been rather brighter than that of the steam scalded, though the former was sometimes characterised as unnaturally vivid.

Flavour. The flavour of steam scalded cabbage was better than that of water scalded cabbage: "full cabbage flavour" was recorded by the taste panel for 59 out of 153 samples (39%) and in 7 out of 33 water scalded samples (21%).

Texture. The texture was generally satisfactory whether water or steam scalding was used.

3. Storage properties

In Table 6 steam and water scalded cabbage of three varieties, stored for 6 months at 37°C. are compared. In each pair the water-scalded material has developed a greater degree of browning and lost a higher proportion of ascorbic acid than the steam-scalded material.

B. CARROT

1. Losses and yields

A comparison of scalding carrot strips in steam and water (the latter with the concentration of soluble solids in the scald liquor between 3 and 5%) gave the following results (Table 7):

(i) The total loss of dry matter averaged 13·9% when water scalding was employed and 11·9% when steam scalding was used, with an increase in yield of 2·5% resulting from steam scalding.

(ii) The scalding loss was calculated to be 11·9% in water and in steam 8·5% of the dry matter entering the strippers.

(iii) The leaching loss in water scalding, calculated from the soluble solids content of the raw and dehydrated carrot, averaged 9·2%, and, when scalding was in steam, 4·3% (Table 8).

When thinner strips (3/32 × 5/16 in. cross section) were used (see Table 7):

(i) The total loss of dry matter averaged 24·0% with water scalding and 11·4% with steam scalding.

(ii) The leaching loss in water scalding was 17·4%, compared with 6·1% for steam scalding.

2. The quality of the product

Appearance. The dehydrated steam scalded carrot was dull and unattractive in appearance compared with the water-scalded material, but this dullness disappeared on reconstitution and the cooked products were equally bright in colour.

Flavour. The flavour of the steam-scalded product was generally similar to that of the best water-scalded product, but in some cases the water-scalded material had a "caramelised" or "marmalade-like" flavour (and odour) which was never detected in the steam-scalded material.

Texture. The texture was similar in the two cases.

Table 9. Dehydrated Potato

YIELDS RESULTING FROM WATER SCALDING AND STEAM SCALDING

Strip dimensions (in.)	*Variety*	*Run*	*Water scalding*		*Steam scalding*	
			Yield as % of trimmed potato	*% Recovery of dry matter*	*Yield as % of trimmed potato*	*% Recovery of dry matter*
5/16 × 5/16	King Edward VII ...	167	13·7	80·2	15·7	92·0
		172	15·9	87·5	17·3	95·1
		174	14·7	85·6	15·9	92·5
		177	15·5	88·7	16·7	95·0
		178	14·8	86·7	15·4	90·4
		180	15·4	89·5	16·0	93·0
		181	15·8	89·3	16·3	92·1
	Conference	234, 235	22·7	88·4	23·6	91·1
	Mean		16·1	87·0	17·1	92·6
¼ × 5/16	King Edward VII ...	164	13·1	75·9	16·3	94·2
		177	14·5	83·0	16·5	94·2
		178	13·9	81·4	15·3	90·6
		180	14·2	83·0	16·5	95·6
		181	15·0	84·9	16·0	90·4
	Conference	234/235	22·8	84·6	22·8	89·8
	Mean		15·6	82·1	17·2	92·4

3. Storage properties

Steam-scalded dehydrated carrots showed greater resistance to browning than the water-scalded material from liquor of relatively low concentration (Fig. 1). The resistance of the water-scalded material decreased with increasing concentration of the scald liquor (Fig. 2).

C. POTATO

1. Losses and yields

In Table 9 are shown the results of scalding potato strips 3/16 × 5/16 in. cross section and 1/8 × 5/16 in. cross section in water and in steam.

When the thicker strips were used, the total loss of dry matter with water scalding averaged 13·0% and that during steam scalding 7·4%; the increase in yield resulting from steam scalding was 6·2%. When the thinner strips were used water scalding led to an increase in loss, the figure being 17·9%, but with steam scalding the yield was almost exactly the same as that obtained from the thicker strips.

2. Quality of products

The appearance, flavour and texture of water-scalded and steam-scalded dehydrated potato strips have been generally similar.

3. Storage properties

Steam-scalded potato strips have been somewhat less resistant to browning during storage at 37°C. than water scalded material (Table 10 and Fig. 3).

Drying

Steam-scalded vegetables, in particular potato, have been somewhat more liable to heat damage during dehydration than water scalded vegetables, and to avoid visible browning it has been necessary to lower the temperature of the final drying stage by 5°F. when steam scalding was used.

Discussion

It has already been mentioned that the figures quoted for losses during water scalding include a proportion of mechanical loss, but the great increase in yield resulting from small increases in the concentration of the scald liquor,[14, 15] and the extent of leaching losses in water under experimental conditions in which mechanical losses are avoided,[11, 12, 13] suggest that the total scalding losses must contain only a small element of mechanical loss: the figures for scalding losses in Tables 3 and 7 are probably not greatly in excess of the actual leaching losses.

Under the conditions of the experiments described the equilibrium scald liquor concentration for cabbage was about 1·4%, and this had no adverse effect on the quality of the product; at higher concentrations the quality of the product and its resistance to browning diminishes.[17] In carrot scalded at high scald liquor concentrations a caramelised flavour occurred, and the storage life at 37°C. was sharply reduced. This was at first explained by the suggestion that the reduced leaching at higher scald-liquor concentrations was leaving in the tissue higher concentrations of easily caramelised substances which would suffer during dehydration, and higher concentrations of the substances which took part in the browning reaction during high temperature storage. On this basis, steam scalding would have been expected to lead to still greater liability to browning, but the reverse proved to be the case, both with cabbage and with carrot. Scalding in even quite dilute liquors gave products less resistant to browning than did steam scalding, and it therefore seems that impregnating the vegetable with a liquor containing solutes which have been "cooked" for some time may be the factor responsible: it is not unlikely that reactions have taken place in these liquors which will affect the flavour and accelerate the deterioration of material scalded in them.

With potato, on the other hand, steam scalding did lead to the expected reduction in high-temperature storage life, and if steam scalding is used in the manufacture of dehydrated potato it will be all the more necessary to ensure that the raw vegetable has a low content of reducing sugars.[e.g.16]

Early experience in this country did not favour steam scalding; the products tended to have variable sulphite content and to be of poor quality—in particular the potato was covered with a film of gelatinised starch which led to sliminess in the cooked material. Improved techniques of sulphiting by sprays and, in the case of potato, of adequate washing to remove superficial starch before scalding, have removed these objections to the products. That the loss of solutes by scalding in steam is substantially less than during water scalding has been confirmed, the loss in the large scale steam scalding of carrots being very similar to that found in pilot experiments.[20]

It is evident, then, that although

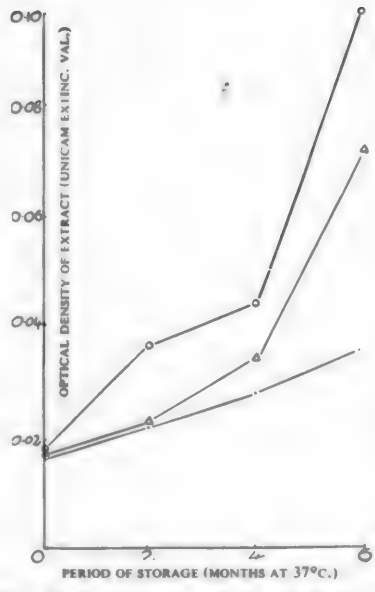

Fig. 2. Development of brown discoloration in dehydrated carrot stored at 37°C. Comparison of material scalded with low medium and high concentrations of soluble solids in the scald liquor.

⊙—⊙ carrot strips with moisture content 6·3% and SO_2 content 562 p.p.m.: scalded in liquor containing 4·90% soluble solids.

Δ—Δ carrot strips with moisture content 6·1% and SO_2 content 567 p.p.m.: scalded in liquor containing 2·31% soluble solids.

·—· carrot strips with moisture content 5·9% and SO_2 content 609 p.p.m.: scalded in liquor containing 1·16% soluble solids.

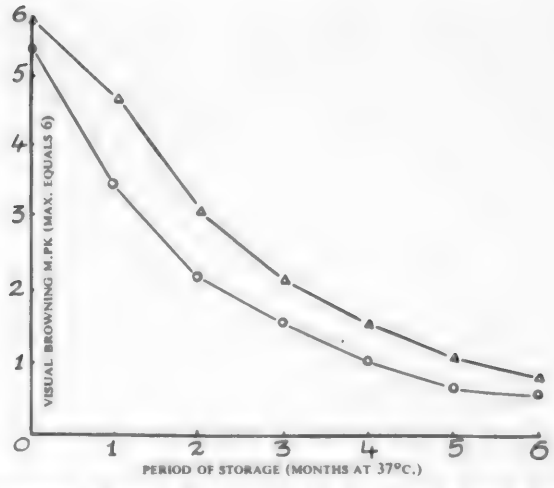

Fig. 3. Development of brown discoloration in dehydrated potato stored at 37°C. : comparison of material scalded in steam and in water (averages of 10 batches for each treatment.)

▲—▲ potato scalded in water (soluble solids content of scald liquor 1·0-1·4%).

⊙—⊙ potato scalded in steam.

Visual browning marks: 6=no browning: 0=severe browning.

water scalding may yield green vegetables of a rather more vivid colour than steam scalding, and allows simpler chemical dosing and slightly higher finishing temperatures, steam scalding possessed many real advantages:

(i) The yield of dehydrated product is higher, especially in vegetables containing high contents of soluble material.

(ii) The flavour of the steam-scalded product is frequently better.

(iii) In the case of cabbage and carrot, the resistance to browning during high temperature storage is greater.

If the steam scalding is done on trays and water scalding in the commonly used rotary blancher, there are certain further considerations which favour steam scalding.

(iv) Tray spreading is carried out with cool crisp material, and, particularly in the case of leafy vegetables, is much easier than with warm, limp scalded material; better tray spreading is possible leading to more even drying and freedom from wet patches.

(v) The vegetable is not touched by hand between scalding and drying, and the possibility of bacterial contamination is therefore greatly reduced.

(vi) No artificial cooling is necessary; the material being spread in thin layers, with good access to the air, cools quickly.

Table 10. Dehydrated Potato

VISUAL BROWNING MARKS FOR WATER-SCALDED AND STEAM-SCALDED DEHYDRATED POTATO STORED AT 37°C.

Batch No.	*M/C*	*SO_2 p.p.m.*	*Steam (S) or Water (W) scald*	*Visual browning marks*	
				Initially	*After 6 months at 37°C.*
155/8	6·43	663	W	5·75	1·75
155/10	7·12	440	S	6·00	0·65
167/6	6·48	631	W	6·00	0·55
167/7	6·27	591	S	5·75	0·60
168/7	6·76	442	W	6·00	0·70
168/9	6·46	501	S	6·00	0·35
175/5	5·82	505	W	6·00	0·38
175/8	5·53	672	S	5·50	0·20
181/6	6·28	352	W	5·75	0·65
181/8	6·83	368	S	5·50	0·28
182/4	6·06	448	W	6·00	0·90
182/5	6·46	394	S	5·50	0·50

(Visual browning marks: 6=no browning; 0=severe browning.)

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Four new truck bulletins (Nos. B. 1176, 1076, 1107 and 1163) have been issued by the Yale and Towne Manufacturing Co. covering their four Duplex telescopic lift *Worksaver* trucks. The trucks have two pairs of fork channels and a Duplex lifting cylinder said to give extreme high free lift with maximum telescopic lift.

SUBSTITUTE FOODS

MILK ★ RICE ★ CREAM ★ BUTTER ★ EGG ★ MEAT ★ COFFEE ★ TEA ★ COCOA

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Food shortages in Asia have intensified the search for substitute foods such as vegetable milk and synthetic rice. Indian chemists at "Ceftri" have been in the forefront of these developments. Here the scattered literature of the subject of substitute foods is brought into order and perspective. One hundred references are given.

SUBSTITUTE foods are processed food materials which can serve as substitutes for familiar foods like milk, meat, eggs, grain, tea and coffee in times of scarcity. Apart from specific trade names of the individual foods, terms such as "synthetic," "artificial," "ersatz," "machine-made," "man-made" are in common usage to designate these products.

The idea of substitute foods originated a long time ago and in the early years of the 20th century a number of patents concerning the preparation of milk substitutes were taken out. Since then, considerable progress has been made in this direction. The impact of World War II on the food resources of Germany led to the development and use of new substitute foods. The literature on substitute foods is scattered and fragmentary and is covered mostly by patents. In the last decade, the subject has become more important in view of an all-round shortage of bulk and protective foods, particularly in over-populated and under-developed countries.

Besides their role as bulk foods, substitutes may be used as extenders and replacements for coffee, tea, fruit, sausages, creams, thickeners etc.

Milk substitutes

Milk substitutes are said to have originated in China. Centuries ago a Chinese, Wahi Nain Tzelang, discovered how to convert soya bean into an emulsion which could be substituted for animal milk. Today many Chinese use exclusively soya bean milk and its products. The use of soya milk extended gradually from China to other countries and now even the U.K., U.S.A. and Canada which produce plenty of animal milk are manufacturing small quantities of soya milk for specialised uses. In recent years there has been a serious shortage of milk in South-East Asia. Quite recently FAO and UNICEF have sponsored jointly the installation of a plant for the commercial production of milk substitute powder in Indonesia.

Besides soya bean, groundnut, coconut, cashew nut and almonds have been used for the preparation of milk substitutes. The literature on the processing and nutritional aspects of milk substitutes has grown enormously and in this review only some of the more recent publications will be referred to.

Soya milk

This product is made by soaking the clean beans, mashing them and converting the mass into a milky emulsion. Soya bean flour can also be used for making milk.[1, 2, 3] Improved methods of preparing milk have been suggested.[4, 5] On an average 5½ lb. of milk can be obtained from 1 lb. of beans. The solids content of the soya milk (Table I) is lower than that of the cow's milk, but it can be raised to about 12·5% if soya flour is used instead of whole beans.[6] It is difficult to disperse the whole of the bean into the form of milk. The residue, which sometimes amounts to 25% of the beans, presents not only disposal problems but also affects the economics of the process.

The product is reported to be rich in B vitamins,[7, 8] and it also contains vitamin C (22·6 mg/litre), if the beans are germinated for 72 hr. before conversion into milk.[9] The nutritive value of soya milk proteins[5, 8, 10-13] and the availability of its calcium and phosphorus contents,[17-21] have been extensively investigated. In biological value the soya milk proteins rate 80-90% of the value for cow milk protein. The nutritive value of soya milk has also been ascertained by human feeding experiments.[14-16] Feeding tests on infants,[22, 23] showed that the product is easily assimilated and helps to increase growth. Soya milk can be used for preparing curds,[24, 25] cheese,[26, 27] and lactic fermented products.[28]

Groundnut milk

In countries like India where soya bean is not cultivated, *per capita* consumption of natural milk is deplorably low, and the production cost of animal milk is high, serious efforts have been made to use locally available raw materials such as groundnuts for making milk substitutes. Systematic laboratory and pilot plant researches under way for the last five years at the Central Food Technological Research Institute, Mysore, have led to the development of a palatable and nutritionally improved product.[29, 30] In this process the kernels are converted completely into an emulsion. About 8 lb. of milk can be obtained from 1 lb. of the kernels. The milk yields a palatable curd which supplemented the nutritive value of rice when fed to growing children (4-11 years old) for a period of 6 months.[34] The curd has been further processed into a powder[35] which can be widely used in Indian cookery. The effect of processing

Groundnut milk. Deodorisation in a steam-jacketed pan.

and lactic fermentation on the vitamin content of the milk[31, 32] and changes in the nitrogenous constituents during progressive lactic souring of the milk[33] have been reported.

Miscellaneous milk substitutes

Milk substitutes have also been prepared from cashew nuts,[23, 36] coconut,[37-40] almonds[41-43] and sunflower seeds,[44] but in view of the high cost of the raw materials, these milks are not commercial propositions.

It is clear that milks comparable in nutritive value to cow's milk can be prepared from vegetable products. It is also practical to fortify the emulsions with added vitamins and mineral salts. Although vegetable milks are generally acceptable, further improvement in their palatability is necessary to make them widely acceptable. Research to develop efficient methods of deodorisation is badly needed. In our laboratories work is already in progress in that direction and attempts are being made to use a solvent-extracted, odourless, groundnut flour for making milk. Work is also in progress with a view to removing the last traces of the nutty flavour from kernels.[45] The success of vegetable milks depends on achieving a technique which completely eliminates the original flavour of the oil-bearing material. Of course, in certain South-East Asian countries the flavour of soya bean milk is very much liked while in a country like India, vegetable milks are popular only if properly deodorised.

Cream substitutes

According to Mason and Justenson, cream substitutes are generally obtained by emulsifying a vegetable or animal fat with an aqueous suspension using a stabiliser such as vegetable gums. Flours from soya bean, rye and oats are also incorporated.[46] McLane has obtained a patent for the preparation of artificial cream using gelatine as a thickening agent.[47] A process for the preparation of artificial whipped cream from skim milk and gelatinised starch derivative has also been deveolped.[48]

Butter substitutes

Margarine is an established substitute for butter. Vegetable fat can be produced more cheaply than milk fat and hence margarine will always be a cheap and serious competitor for butter. During the war, Germany produced synthetic butter (melting pt. 35°C.) by the Fisher-Tropsch synthesis.[49] It is reported that 200 metric tons of synthetic butter per month were produced in 1944 by the Markische Seifenindustrie at Witten-Ruhr.

A bread spread to suit both warm and cold climates has been prepared from a mixture of vegetable oil (soya bean) with saturated monoglycerides. To this mixture are added antioxidants, vitamin, butter flavour, colour and salt.[50] Two spreads namely, *Mysost* and *Betost* with a whey base have been reported.[51]

Rice substitutes

During and since World War II, there has been an acute shortage of rice in many Asian countries and attempts have been made to process different grains to render them palatable to the rice eaters. The possibility of developing a simple technique by which wheat, *jowar* and maize could be rendered palatable and amenable to easy cooking has been explored at length.[52] Certain other seeds such as bamboo rice, and seeds of sweet sorghum have also been suggested as rice substitutes.[53] Attempts were made to convert the whole grains of wheat, barley and maize into rice-like products. Some brands, *e.g., Rycena, Barley rice,* are already on the market.

In the U.K. during the war, wheat semolina was processed into rice-shaped granules called "Mock" rice. "Potato rice" was produced in Holland.

Japanese workers have also devoted considerable attention to rice substitutes. A Japanese patent describes a process for the manufacture of synthetic rice from a mixture of flour, starch, and casein.[54] Another Japanese patent

claims a process for making synthetic rice from a mixture of broken rice and flour.[53] The grain is treated with steam to form a coating of dextrins. These attempts were based on the conversion of cereals from one form to the other.

In India, research workers made an entirely new approach to the problem with a view to converting non-cereal foods such as roots and tubers into rice substitutes. It was found that the combination of tapioca (*Manihot utilissima*) and groundnut flours would make a cheap and satisfactory blend. On dry basis, cassava yields 3-4 times as much food (calories) per acre as in the form of cereal grains. Tapioca starch, like other root starches, tends to cook to a sticky mass and it was in the processing of such starchy materials that the greatest difficulty was experienced. But by the incorporation of 35-40% by weight of boiling water into tapioca-groundnut flour mixtures, a satisfactory dough which could be extruded under pressure was obtained. It has now been possible to produce a rice substitute in the form of rice-shaped grains from a blend of groundnut-tapioca flours. In certain compositions 15-20% of wheat flour has also been incorporated.[56, 57] Synthetic grain developed at the Central Food Technological Research Institute, Mysore, has the appearance of slightly under-milled rice. It is best cooked in boiling water and the cooking is completed in 5-6 min. as compared with 20-30 min. taken by raw milled rice. The storage properties[58] and nutritive value[59-61] of this grain have been fully studied. It has a satisfactory storage life. Samples of synthetic rice made in the early part of 1953 and lying since then in our laboratories are almost free from off-taste and odour.

While the work was in progress at Mysore, it was reported that the Japanese had also undertaken the manufacture of synthetic rice in 1952-53. They used potato starch, wheat flour and powdered rice in different proportions. The chemical composition of some of the rice substitutes is compared with natural rice in Table 2.

More recently, a German seed grower named Werner Heinrich has developed a new type of rice called "Heinrich" rice. The grain looks like slender maize hominy. A Dutch patent describes the processing of potato and corn starch into substitutes for tapioca flakes, rice,[62] etc.

Table 1. Composition of Cow,[30] Soya bean[4] and Groundnut Milks[30]

Milk	*Total solids* %	*Protein* %	*Fat* %	*Ash* %	*Carbohydrates* %
Soya bean	10·10	4·2	3·4	0·70	1·8
Groundnut	12·07	3·0	5·2	0·80	3·07
Cow	12·62	3·3	3·75	0·72	4·85

Milk	*Vitamins per litre*				
	A. *I.U.*	*Thiamine* *mg.*	*Riboflavin* *mg.*	*Nicotinic acid* *mg.*	*Ascorbic acid* *mg.*
Soya bean ...	750	0·82	1·10	2·49	21·6
Groundnut ...	1,400	0·65	2·00	11·10	17·7
Cow	1,320	0·45	1·70	1·26	15·9

Although rice supplies have improved in India, the Government of India are continuing the development of synthetic rice and a production unit will soon be in operation at Mysore. The outlook for rice substitutes is bright because it is possible to incorporate fortifying agents so as to make the synthetic grain more nutritive than any natural grain in the same category. It is in this direction that future development ought to take place. No doubt a processed grain is likely to be more expensive, but the extra nutrition that the grain provides should offset the increase in cost.

Egg substitutes

The shortage of eggs in Germany during the war led to the development of egg substitutes (*Milei* products). They were derived from whey, blood plasma, fish proteins and plant proteins. The substitutes had excellent whipping properties and could be used in bakery products.[63] A product called *Gelsoy* containing 55% protein has been developed from soya bean protein as a substitute for egg white.[64] The soya bean protein derivative is equal or superior to egg albumen with respect to whipping properties and "weeping" tests but it is inferior to egg albumen in coagulation tests.[65] An albumen-like product has also been prepared from soya bean flour by the action of endotryptase.[66] A substance showing whipping properties and constituting about 37% of the weight of soya flour has been isolated[67] by precipitation at *p*H 5. A Belgian patent covers a process for the preparation of egg substitutes from skim milk or whey.[68] Egg substitute containing agar-agar or isinglass and a frothing substance based on saponin, water and glycerol has been evolved.[69] Powdered mustard has been made into a stable colloidal emulsion in edible gum or gelatin solution and used as a substitute for egg yolk.[70] Egg-substitute from linseed is claimed in a new patent.[71] *Bindowa*, an egg substitute from linseed, was developed in Germany during the war.[72] Another egg substitute consists of processed rice flour 100, tapioca flour 25, powdered skim milk 25, powdered hen egg albumen 10, cream of tartar 3, baking powder 1 lb. and yellow colouring matter 8 oz. Four grams of this mixture is equivalent to 1 egg.[73] A Dutch patent deals with a substitute for egg white.[74] The nutritional and biological values of egg substitutes have been reviewed.[75]

Meat substitutes

A number of substitutes for meat have been developed and the processes are mostly covered by patents. A German patent[76] describes the preparation of a meat substitute from a mixture of soya bean or soya bean meal freed of bitterness, a starchy bonding substance and condiments. A processed mixture of cotton, peanut

Table 2. Chemical Composition (Per Cent.) of Rice Substitutes Compared with Rice[56]

	Natural rice[1]	*Rycena*[2]	*Mock rice*[3]	*Pearled barley (barley rice)*[4]	*Japanese syn. rice*[4] *A*	*Japanese syn. rice*[4] *B*	*Mysore (Indian) synthetic rice*
Moisture	13·0	8·2	14·0	10·08	14·0	14·0	9·5
Protein (N×6·25)	6·9	10·7	10·7	9·85	3·7	7·0	14·2
Fat	0·4	1·6	1·8	1·88	0·3	0·5	1·9
Carbohydrates	79·2[6]	69·3[5]	77·5	69·0[6]	81·1[6]	77·4[6]	71·7
Fibre	—	—	—	—	0·3	0·4	0·7
Ash	0·5	1·22	—	1·35	0·6	0·7	2·0
Calcium (as Ca)	0·01	0·05	0·018	0·036	—	—	0·19
Phosphorus (as P)	0·11	0·24	0·114	0·20	—	—	0·15
Thiamine (mgm.)	0·06	0·19	—	0·02	—	--	0·22
Calorific value per 100 gm.	348	343	352	340	344	343	361

[1] Health Bull. No. 23 (Govt. of India, 1951).
[2] From pamphlet issued by Rycena Food Products Pty, Ltd., Melbourne.
[3] Same as semolina (M.R.C. Report No. 235, 1946), " Chemical composition of foods " (H.M.S.O., London).
[4] *Rice Journal*, 1954, **57**, 20-22. (Synthetic rice A is made up of potato starch 50%, wheat flour 40%, rice flour 10%; and synthetic rice B of potato starch 20%, wheat flour 70%, rice flour 10%.)
[5] As starch.
[6] Calculated by difference.
— Figures not available.

and soya bean flours has been suggested as a meat substitute.[77] A synthetic meat product reported to resemble natural meat in appearance, flavour, nutritive value, etc., consists of filaments of acid-coagulated soya bean protein.[78] Edible cereal or protein binder and melted fat are also incorporated into the protein filaments. A U.S. patent[79] deals with a process in which a mixture of non-fat milk solids, starch (potato, rice, corn), a vegetable gum (carboxymethyl cellulose, carrageenin, etc.) and a small amount of vegetable fat is used in the composition of meat substitute. *Torula utilis* has been processed as a meat substitute.[80] Yeast from wood sugars and sulphite waste were used in Germany as substitute and extenders for meat.[81] The mould *oidium lactis* and torula yeast were propagated in neutralised waste liquor from paper and textile mills in Germany and after washing and drying used as meat substitutes.[82] A meat substitute called " vegetable meat " has been prepared from coagulated soya bean protein.[83] As most of the meat substitutes are derived from vegetable proteins, these should have a greater scope in vegetarian countries like India.

Coffee substitutes

Roasted cereals have long been used as coffee substitutes. According to a patented process,[84] inulin-containing material is heated in the presence of moisture and the products of hydrolysis are converted into caramel. The material thus obtained has been used as a coffee additive. A coffee substitute containing 39·26% water-soluble extract and 7·23% reducing sugars has been prepared by roasting under certain conditions the fruit of the fig cactus.[85] A dry extract of coffee has been prepared by acid hydrolysis of a previously infused coffee residue.[86] Coffee substitutes have been prepared from vegetable materials containing pentoses or polypentoses (potato pulp or peeling, flax waste, potatoes, etc.).[87] According to a patented process,[88] dahlia tubers and chicory root, etc., are subjected to moist heat to degrade inulin. The hydrolysed stuff is dried and roasted. Preparation of a coffee substitute by roasting oil-bearing seeds such as soya beans and peanuts is covered by a French patent.[89]

A U.S. patent[90] requires the use of alfalfa for making coffee substitute which contains: protein 18·6%, moisture 6·92%, fibre 1·37%, ash 17·3% and fat 0·22%. A mixed coffee-milk substitute has been made from soya beans, barley, chicory, sugar beet and disintegrated dried figs.[91] A Swiss patent[92] deals with the preparation of a coffee substitute from chicory and malt dextrins. Another Swiss patent[93] describes the preparation of coffee substitute from cacao-bean waste, which is treated with sugar and potassium carbonate. It contains about 1% theobromine in soluble form. A coffee substitute from the tailings, husks and shells obtained in the processing of cacao beans forms the subject matter of another Swiss patent,[94] according to which the materials are impregnated with 1% K_2CO_3 solution subjected to fermentation at 37°C., and then roasted. Seeds of fruits and berries, especially grape seeds, have been roasted to prepare infusions which may serve as coffee or tea substitutes or supplement.[95] Use of malts and roasted barleys as coffee substitutes has been reported.[96]

Tea substitutes

The most important substitute for tea is maté, made from the dried leaves of *Ilex paraguayensis*, a shrub belonging to the family of *Aquifoliaceæ*. A beverage called *cassina* is made from the cured leaves of a caffein-containing species of holly, *Ilex cassine*, indigenous to North America. Leaves of plants such as blackberry, raspberry and strawberry have been especially cured to give tea substitutes.[97] According to another patent fruit tree leaves are cut, dried, impregnated with essential oils and fermented. After drying citric acid solution is added to the leaves.[98] The subject of tea substitutes has been reviewed.[99]

Cocoa substitutes

Peanuts, lotus nuts and Indian red beans have been processed into

cocoa substitutes. The process has been patented.[100]

Conclusions

As mentioned, future research and developments in substitute foods should take note of the fact that it is possible to make synthetic blends of scientifically selected ingredients in such a way as to impart a very high nutritive value to the final product. In doing so due regard must be paid to the palatability of the final product. To the ordinary consumer the terms "synthetic," "artificial" or "substitute" are derogatory when applied to food. However, the popularity of margarine, even in highly sophisticated markets, proves that it is possible to make a success of substitute foods and even to create a preference for them.

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(*Continued on p.* 390)

THE new refining system at Van den Berghs and Jurgens' recently opened edible oil refinery at Bromborough Port, Cheshire, is claimed to be the most efficient in the world. Over 300 ft. in length the refinery has taken 4 years to complete and will increase by half the potential output of the adjacent margarine factory. Operating continuously, a greater tonnage per man is handled than in the old refinery. Ten men per shift (with another 12 on ancillary tasks) operate 28 neutralisers and deodorisers, whereas the same number was used to control 17 vessels in the old refinery.

A feature of the plant is the adoption of electrical devices for recording and signalling.

Automatic Control at Margarine Oil Refinery

All controls are accessible on one level and at each vessel. A control panel in the neutraliser section indicates which vessels are in use, amounts of wash waters to be withdrawn, temperatures, pressures, amounts of cooling water and condensing water available, and the remote control of certain pumps.

There is no change in the basic refining processes or in the oils used—namely, groundnut, palm kernel, coconut, palm, cottonseed, and a variety of hardened oils—groundnut, palm oil and whale oil. These oils are imported either all ready for hardening and/or refining, or in the form of seeds and nuts from which the oils are extracted. After extraction they are shipped to Bromborough Port; from there they are taken to the refinery in rail tank cars of 10-15 tons capacity. On arrival, they are discharged into 14 neutralisers holding 30 tons each. Here oil is treated with caustic soda which combines with the free fatty acids to form water-soluble soap. This is withdrawn, and the remaining oil is washed with hot water to remove the last traces.

The neutral oil is then decolorised with fuller's earth and travels to the filter presses. The filtered oil then passes into the deodorisers —there are 13 vessels of 25 tons capacity and one smaller vessel—where it is raised to deodorising temperature (160-230°C.) under high vacuum. After this the oil is cooled to between 40-50°C., weighed and delivered to the margarine factory.

Nearly 2,000 tons of steel have been used in the new plant. It contains 22 miles of piping and 18 miles of electrical cable. To run it, 20 million gal. of water and 10 million lb. of steam will be used per week.

Mr. Clive Van den Bergh said at the opening ceremony: "This is a great day in the history of a remarkable industry."

▲Neutraliser control panel, the centre of the control system.

◀ Top floor of the refinery. The neutralising/bleaching vessels are in the foreground and the deodorisers are in the rear. The neutraliser control desk is in the centre foreground.

MEAT, FISH and F.I.O.

Studies on beef quality, wastage of meat due to transport of animals, improved methods of smoke curing and drying and the freezing of fish were made by the Food Investigation Organisation last year and are described in their recently published annual report, "Food Investigation—1955."

MEAT AND MEAT PRODUCTS DIVISION

Quality of beef

WHILE no final conclusions have been reached as a result of experiments on the quality of beef carcases carried out in co-operation with the Commonwealth Scientific and Industrial Research Organisation in Australia, there have been a number of important results. The experimenters were seeking confirmation of earlier tests which suggested that beef from steers injected before slaughter with magnesium sulphate and subsequently blast-frozen whilst hot tended to drip less on thawing than did beef treated in the normal commercial manner. The work had also suggested that pre-slaughter injections of pyrophosphate might make the resultant beef more tender and that beef of high ultimate *p*H was of low palatability.

It was found that the drip on thawing frozen mutton, pork, veal and beef is of the same order of magnitude as if it is measured under comparable conditions, *i.e.* if the samples come from the same muscles and are of the same shape and size. This suggests that drip from frozen beef could be due more to the extent of cut surface and to the weight of the joints rather than to some intrinsic difference in the muscles of the ox as compared with those of pigs and sheep.

Carcase wastage

Carcase wastage is a serious and important problem in the meat industry. An animal killed immediately at the slaughterhouse after a short journey provides a heavier carcase and heavier offal than an animal sent a long distance and then rested and fed for a few days. An investigation of this form of wastage has shown already that it is difficult to cause any great wastage in cattle, no matter what the length of the journey or the period of rest before slaughter. With sheep it is a different matter. Resting and feeding for 2, 3 or 4 days before slaughter gave carcases which were, respectively, 97, 95 and 95% of the weight of those killed immediately on arrival. Figures for liver wastage were 88, 84, 82%. An odd effect occurred when the length of the journey was increased from 20 or 30 miles to 100. If the weight of the liver for the short journey was called 100% then for the long journeys it was 103 and 117%. Further experiments will show if this "shaking up of the liver" always increases its weight.

Quality in dehydrated meat

Investigations have shown that the deterioration in dehydrated meat during storage in the absence of oxygen is caused by a typical browning reaction between the reducing sugars and the protein and free amino-acid fractions. Although both these nitrogenous fractions contribute to the development of the brown discoloration the characteristic unpalatable bitter flavours which are produced are derived from the free amino-acids.

Observations on the changes in the carbohydrate fractions with time *post mortem* have shown that the reducing sugar fractions are most likely to be present in low concentrations in meat (*a*) if the glycogen content at death is below normal and (*b*) if the enzymic action is either stopped by processing the meat as soon as possible after death, or slowed down by chilling to 0°C. or freezing to −10°C. or below. If frozen the meat should be processed as soon as possible after thawing.

Other experiments carried out by the division have included studies on *rigor mortis* in relation to the growth of anærobic bacteria in meat, investigations of spoilage in canned hams and in canned bacon.

The relative susceptibility of frozen meat to bacterial growth is being studied and investigations on normal *rigor mortis*, or *rigor mortis* following freezing (thaw-rigor) and of the behaviour of model systems have been made in order to link fundamental studies with those on the freezing and thawing of meat carcases. The work is continuing and it is hoped to elucidate the exact role of adenosine triphosphate in the contractures during normal and thaw-rigor. In particular the relation between the splitting of ATP by the contractile proteins and the power developed during slow or rapid contraction is being carefully re-investigated.

FISH AND FISH PRODUCTS DIVISION

Quality of iced fish

Better methods of sensory and objective assessment of quality of iced white fish are being sought, and investigations are continuing on the efficacy of a panel system of scoring quality on the basis of appearance, smell and taste. The tetrazolium test paper for rapidly assessing quality (*see* FOOD MANUFACTURE, May 1956, *p.* 179) has been applied in experiments on the spoilage of fish stowed in ice, quality being assessed at the same time by the usual bacteriological, chemical and organoleptic methods.

"Clean" and "dirty" ice

In last year's Report it was stated that washing fish on board ship seemed to have little effect on keeping quality. The bacterial

loads on washed and unwashed fish, measured within 1 hr. of washing, were rather similar. This work has been continued and has shown that the ice used on board the fishing vessel may have very high bacterial loads by the time it is used for icing the catch. The use of such ice would wipe out any advantage gained by washing the fish. Experiments with "clean" and "dirty" ice proved that though the fish in "clean" ice kept some two to four days longer than that stored in "dirty" ice, washing had only a very slight effect.

Fish box cleaning

Scrubbing, with the use of a strong disinfectant, is the only practicable method of cleaning wooden boxes. This is the result of experiments at the Humber Laboratory. Boxes coated with an impermeable resin were much less heavily contaminated than the porous wooden ones and were more easily cleaned. Unless both types of box were scrubbed, however, surface contamination increased despite the use of disinfectants.

A questionnaire on cleaning practices has been sent to a cross-section of the industry. The replies make it clear that it has little knowledge of the principles of cleaning, on the whole. On the other hand most firms are aware of the difficulties and are anxious to know more.

Fish transport

Experiments are continuing on the deterioration of fish transported in insulated railway vans and on the strength of existing types of fish boxes. Priority is being given to the production of a 6-stone non-returnable container made by moulding resin-impregnated paper-pulp.

Freezing and cold storage

Work described last year on the physical factors affecting freezing has been completed and experiments are continuing with a new air blast freezing tunnel built at Torry. A new method of assessing the effect of rate of freezing on damage to fish muscle by estimating the amount of deoxypentose nucleic acid, a cell constituent in the expressible fluid of thawed fillets, has been developed.

Experiments on the deterioration of fish during cold storage have shown that much of this deterioration is due to changes in the proteins, and an accurate means of measuring such changes would be valuable. The "soluble protein nitrogen" as measured by extracting muscle with dilute salt solutions, is a somewhat variable quantity in fresh fish, and the reasons for these variations have been investigated. There is a linear relationship between the amount of soluble protein in minced cod fillets and the size of the fish, the smallest fish yielding the most soluble protein. Samples from different parts of the same fillet were found to yield different amounts of soluble protein and extraction of proteins in dilute salt solution was found to be almost complete if the myotomes (muscle segments) were dissected out free from the myocommata (partition membranes between the myotomes). A method has been evolved in which only certain myotomes are dissected out and results have so far been obtained for soluble protein with less than 1% variation from fish to fish for sizes ranging from 10 to about 32 in. A small drop in solubility was still found with the largest cod and work on a suitable correction is being undertaken so that soluble protein determinations may be completely independent of the site of the fish.

Vertical plate freezing of fish

Work on freezing of fish at sea has continued during the year. The results of experiments on freezing herring in vertical plate freezers are encouraging. Fish held in cold storage for three months had an excellent flavour when cooked and were free from rancidity. Most of the fish were made into kippers. The yield of first class quality was not as high as that usually obtained with hand-packed half-stone blocks of air-blast frozen herrings, but this was probably due to incorrect setting of the splitting machine. Further tests are to be carried out after the fish have been in cold store longer.

Smoke-curing

Studies on smoke-cured white fish and herring have included investigations on the physical properties of wood smoke and of the physical aspects of its deposition on fish. It has been observed that the vapour phase contributes significantly to the uptake of smoke constituents on wet surfaces. The new electrostatic method of smoking fish, based on the dispersion and the deposition on fish of electrically charged smoke particles in a field-free space has been successfully applied in a 40-stone Torry type kiln, and kippers produced by this method are claimed to be as good as those smoked by the normal method. Arrangements are being made with a bacon firm for trials of electrostatic smoking.

Smoke production

There has been further development of the "fluidiser" mentioned last year, in which sawdust is maintained as a fluidised bed by a stream of heated air, and the temperature is controlled to produce destructive distillation rather than combustion. Work has proceeded from the laboratory scale to that of a 10-stone Torry kiln and it has been established that kippers may be satisfactorily smoked with only about one-third of the normal quantity of sawdust. The shape of the fluidisation chamber is of critical importance and a patent is being sought for the best design, a truncated cone of small angle. When the sawdust is decomposed in the fluidised bed, the final charred particles are less dense than the original sawdust and are hence carried upwards in the gas stream. Advantage has been taken of this to convert the apparatus from "batchwise" to continuous operation. Fresh sawdust is fed in by a worm feeder and the decomposed material carried out with the smoke, from which it is separated by a cyclone. Arrange-

ments are being made with a bacon curing firm to test its use in smoking bacon.

Smokemeter

The Torry recording optical-density smokemeter (*see* FOOD MANUFACTURE, March 1956, *p.* 112) is now being made commercially. It is believed that this instrument will have wider applications than in the smoke-curing of foods. Progress has also been made with the design and testing of a simple photo-electric smoke-density indicator.

Experiments on the chemistry and histology of wood smoke and of process and quality control in kippering have also been made.

Drying

A proper understanding of many processes in fish curing and preservation requires a fuller knowledge of the fundamental processes of water migration in the fish under various conditions. Experiments have been made on the diffusion of water in fish flesh and in starch; the latter being made to elucidate the fundamental mechanisms which affect the process of dehydration.

A small plant for vacuum freeze-drying fish in sufficiently large quantities to enable tasting and storage tests to be carried out systematically has been constructed and will shortly be in operation. Vacuum freeze-drying results in a product closest to the original fish in reconstitution.

The effect of protein denaturation on the texture of dehydrated fish was also studied. The addition of denaturation inhibitors to the flesh might result in improved dehydrated products through decreasing the tendency of the protein to form cross-links. However, attempts to apply the findings to blocks of fish flesh have not so far met with success, though when the salt content of air-dried minces was adjusted to about 0·05-0·1 molar, there was a slight improvement in softness and reconstitution.

Fish by-products

It is often necessary to preserve herrings before processing them for meal and oil. Preservation experiments have been carried out at temperatures mainly in the range 12·8°-18·3°C., by dipping the fish in mixtures of formaldehyde and sodium nitrite. The Herring Industry Board have designed and are building a machine in which the dipping process of preservation will be carried out automatically.

Bacteriology and biochemistry

Marine bacteria are the main agents in the spoilage of fish, but marine bacteriology is still a largely unexplored field. Systematic basic studies have therefore continued, particularly on the flora of skate and lemon sole and of cod and the effects on it of handling, and of the flora of spoiling iced fish. A bacteriophage has been isolated from sea water and investigations have been made on the taxonomy of luminous bacteria, the development of differential culture media and on the bacteriological quality of ice and its influence on the spoilage of chilled fish.

Examinations of the nature and condition of the constituent proteins of fish muscle are continuing and additional information about the differentiation of species of fish by the electrophoretic analysis of extracts of the more soluble muscle proteins has been gathered. Lipids, partly in the form of lipo-proteins, are believed to affect the quality of fish after processing and work has continued on the synthesis and properties of various phospholipids.

Other biochemical investigations have been on fat oxidation, the metabolic products of marine micro-organisms and on phenolic compounds of biological importance.

ACTION ON ADDITIVES

INTERNATIONAL action on food additives was advocated by the joint FAO/WHO conference held in Geneva last September, whose report has now been published (W.H.O. *Technical Report Series*, No. 107, 1s. 9d.). Organised to "consider the contribution which WHO and FAO can appropriately make in this field and how far international consultations in connection with food additives could be co-ordinated within the framework of WHO and FAO," the conference also recommended the desirability of convening an expert committee which would try and lay down broad principles governing the use of food additives: additives in this sense meaning "non-nutritive substances which are added intentionally to food, generally in small quantities, to improve its appearance, flavour, texture or storage properties."

The conference recommended that both FAO and WHO should collect and disseminate information on the existing legal requirements relating to food additives in various countries and on the physical, chemical and biological properties of individual substances. Both organisations should co-operate with official and non-official bodies in this field so as to co-ordinate scientific programmes to obtain the fullest information on individual additives without undue duplication of effort.

The expert committee should be convened as soon as possible and should carry out four main functions:

(*a*) To formulate general principles governing the use of food additives, with special reference to their legal authorisation and the social, economic, psychological and technological reasons for their use.

(*b*) To recommend suitable uniform methods for the scientific examination of additives and of their breakdown products, for the pathological investigation of experimental animals and for the interpretation of results.

(*c*) To study existing data sheets and advise on their possible revision.

(*d*) To advise on future activities of FAO and WHO in the field of food additives.

Priority would be given to food colours, preservatives (antimicrobial agents and antioxidants) and emulsifiers.

OILS AND FATS: Today's Position and Tomorrow's Trends

Each year during the congress held by the International Association of Seed Crushers, a statement is made on the current situation of the world oils and fats industry. For the past 10 years, this statement has been made by Mr. J. C. A. Faure, who is now recognised as probably the foremost authority in the world on this subject. Here are summaries of Mr. Faure's address and of two other papers given at the 34th Congress at Lucerne.

The World Situation

By J. C. A. Faure

THE price curve both in the U.S.A. and in Europe showed very little movement during the second half of 1955. The autumn recovery, which one might have expected, failed to materialise. The reason was obviously the prospect of enormous crops and production in the U.S.; the cotton crop, in spite of reduced acreage, far exceeded expectations. At that time we also faced a very large soya bean crop, whilst production of lard and tallow both promised substantial increases.

Soon after the turn of the year a number of developments began to take effect. The olive oil crop, which should have been a large one, proved a serious disappointment. The sunflower crop in the Argentine was inadequate even for domestic requirements: the linseed situation had undergone a complete change: there were reports of short crops of various oilseeds in India, Pakistan, Turkey, South America and so on. On top of all this there was the general increase in the world's consumption.

Washington was not slow to realise its opportunity for marketing the enormous production of U.S.A. oils and fats. Instead of the C.C.C. becoming, as before, the actual buyer of surplus supplies, it was decided to help the world to come and buy freely in the American markets. Enormous sums of dollars were allocated to a number of countries with which to buy surplus agricultural commodities in the U.S.A. In exchange for these dollar allo-

Oils and Fats: Salient Statistics

(In Terms of Oil or Fat)

	Pre-War	1954	1955 *Preliminary*	1956 *Forecast*
World Supply*				
World Production — Metric Tons (000)s	21,590	25,860	26,660	27,350
World Population (millions)	2,130	2,652	2,680	2,710
World *per capita*—lb. ..	22·3	21·5	21·9	22·2
World *per capita* deficit on pre-war—lb.	—	0·8	0·4	0·1
Amount required to restore pre-war *per capita*—Metric Tons (000)s	—	1,020	505	120
Total World Exports				
World Exports—Metric Tons (000)s	5,830	6,400	6,830	6,820
of which—				
U.S.A. — Metric Tons (000)s	100	1,690	1,790	1,910
Other Countries—Metric Tons (000)s ..	5,730	4,710	5,040	4,910

* It is emphasised that *per capita* figures are calculated from production and do not necessarily reflect actual consumption in the years stated.

Exports and Imports

Metric Tons (000)s

	1954	1955 *Preliminary*	1956 *Forecast*
World Exports	**6,400**	**6,830**	**6,820**
Deduct: U.S. Requirements	430	490	430
Other American Countries (including Canada)	510	500	570
Japan	285	425	425
Africa and Middle East	250	275	290
India, Pakistan, Burma	140	130	130
Australia and New Zealand ..	50	55	55
Other Countries (excluding 16 Western European)	555†	725†	625†
TOTAL ABOVE	2,220	2,600	2,525
Apparent Balance of Exports available to 16 Western European Countries (A) ..	4,180	4,230	4,295
Import requirements of Western Europe (16 countries) (B)	3,900	4,035	4,195
Apparent Export supplies in excess of Western European requirements (A—B)	280*	195*	100

NOTE.—Sixteen Western European countries comprise U.K., Eire, Netherlands, France, Belgium, Switzerland, Denmark, Norway, Finland, Sweden, Austria, W. Germany, Italy, Greece, Spain, Portugal.

† Including U.S. gift shipments to all countries (20 in 1954; 110 in 1955; 25 in 1956).
* Including 30 added to Rotterdam Transit stocks in 1954; −10 in 1955.

cations the importing countries were permitted to pay the U.S. Government in their own local currencies. In addition, there were large outright gifts which carried no obligation whatever to pay. Since this dollar aid programme was embarked upon the amount of dollars allocated has enabled the importing countries to purchase not far short of half a million tons of oils and fats.

It is clear that consumption of oils and fats increases at once when the greatest obstacle, the inability to pay for the goods, is removed. The American policy of disposing of their agricultural production has accounted, to a large extent, for the world's increased consumption. The extent of the foreign demand was quite unexpected and a wave of optimism and enthusiasm swept over the U.S. Conditions, in fact, became an El Dorado for the bull speculator. By speculator I do not necessarily mean an outside gambler who turns his attention occasionally to oils and fats, I include the regular dealers, merchants, shippers and even consumers, who enter into commitments above their normal trading needs.

I believe this wave of speculation, which spread to many parts of the world, lifted prices well above the level justified by conditions and a corrective reaction, which apparently set in early in May, had to be expected.

Now what of the future? This depends on a number of developments on which past statistics can throw no light.

Will the U.S. Government continue its dollar aid programme?

Will the importing countries wish to take advantage of the American aid if their domestic supplies become adequate? I am thinking of the Argentine.

Will the world continue to expand the consumption of oils and fats at the same rate as in the last 3 or 4 years, or will it consolidate at about present *per capita* level?

Will the U.S.S.R. and satellite countries become large importers again or might they become substantial net contributors to the world's export trade?

Estimated World Production of Oils and Fats

Metric Tons (000)s (in Terms of Oil or Fat)

	Pre-War	1954	1955 *Preliminary*	1956 *Forecast*
U.S.A.	3,543	5,865	6,237	6,535
Argentina and Brazil	995	1,093	1,137	1,270
Other America	562	1,040	1,056	1,108
TOTAL AMERICA	5,100	7,998	8,430	8,913
Western Europe (16 countries)	2,914	3,549	3,298	3,240
Western Europe (16 countries) (Whale Oil)	423	313	263	256
Other Europe	1,231	1,132	1,199	1,252
TOTAL EUROPE	4,568	4,994	4,760	4,748
West Africa	1,132	1,716	1,639	1,736
Other Africa	370	701	713	644
TOTAL AFRICA	1,502	2,417	2,352	2,380
India and Pakistan	2,274	2,285	2,504	2,387
Ceylon and Burma	216	208	234	234
Indonesia and Malaya	931	968	963	977
Philippines	452	641	690	753
China and Manchuria	3,341	2,920	3,100	3,190
Australasia and Oceania	575	686	736	772
Other Asia (excluding U.S.S.R.)	628	658	709	667
TOTAL ASIA AND OCEANIA	8,417	8,366	8,936	8,980
TOTAL WORLD (excluding U.S.S.R.)	19,587	23,775	24,478	25,021
TOTAL WORLD (including U.S.S.R.)	21,587	25,863	26,658	27,347

Speciality Oils and Fats

By J. W. Paterson (Loders and Nucoline, Ltd)

By "speciality fat" I mean any fat which has been processed in any other way than the normal refining operations to meet special trade requirements.

New processes and new machines have an increased bearing on the consumers' requirements. A pure hardened coconut oil has a melting point of 28°C., but higher melting points are sometimes required which can only be achieved by producing a speciality fat. Today there is a greater demand for hardened palm kernel oil produced to increasingly tight specifications.

Current demand for stearines and stearine butters is high in the biscuit and confectionery trade. The natural coconut and palm kernel oils have a considerable amount of high melting fraction, and in isolating this fraction a product is obtained which is high in melting point, extremely brittle in solid form and quite free from greasiness. A consumer may find that a hydrogenated oil does not meet his specific requirements because of the wide range between melting points, whereas a stearine will give a much closer range. In the biscuit trade an exact specification is necessary. A consumer who used hardened palm kernel oil in the cream filling of biscuits found that a variation of melting point completely upset his process of sandwiching the filling between the two biscuits. Biscuit manufacturers demand a fat that has a melting point such that it does not liquefy on the band going into the oven, while any cuttings which are returned for re-working must not contain a greater proportion of liquid fat. This can be achieved by incorporating small quantities of high melting point fat so as to raise the complete melting point and help to maintain a solid phase in the dough. If the consumer does not require the complete melting point of the fat raised, but requires the fat in a more workable condi-

tion, it can be aerated whilst packing and 8-10% of air incorporated.

Chocolate couverture is chocolate in block form and is supplied to manufacturers for them to remelt so that the molten product can be used for enrobing. It is defined as a product made from cocoa nib, sugar and added fat, the latter being cocoa butter with or without the addition of milk fat. The finest chocolate couverture is made from cocoa butter. A good quality cocoa butter needs no neutralising, its melting point range is small (87-95°F.) and the latter figure is slightly below normal body temperature so that it literally "melts in the mouth."

Cocoa butter possesses several advantages over its substitutes in the actual production of chocolate materials, *e.g.* it remains plastic over the normal working temperature ranges, which is particularly important in processes such as enrobing. Owing to the high cost of cocoa butter many attempts have been made to substitute other fats, some of which do have similar properties, but they have higher melting points and this makes them unsatisfactory for chocolate making if used alone. High melting point stearines are found unsatisfactory by the chocolate trade as regards cooling curve.

The coconut and palm kernel stearines are, however, highly suitable for making chocolate couverture when mixed with cocoa powder. This couverture is suitable for enrobing biscuits and also for producing cheaper candies of the chocolate type. The disadvantage of products made from these fats containing short chain acids, is mainly their poor keeping properties and the fact that they can break down and give off-flavours. Another type of couverture is made with hydrogenated palm kernel oil, the so-called baker's compound, the soft cutting couvertures and similar products used for icings and fillings in cakes. The product is cheap and suitable for covering irregular surfaces such as eclairs and chocolate cream buns. Disadvantages of these coatings are the rapid incidence of bloom, their softness and the ease with which they show finger marks.

The manufacture of synthetic cream demands careful treatment of the oils used in the process. A volume test is usually applied in which cream is made by whipping with air. If its whipped volume does not amount to 2½ times its volume unwhipped, then the oil or fat is considered unsatisfactory.

The development of auto-oxidation with the formation of peroxides and rancid flavours in oils and fats is a matter of concern, particularly in the early stages of development of a product. It may happen that the product does not have a sufficient shelf life, and this does stress the need to incorporate efficient antioxidants in oils and fats used for trade purposes.

Movement and Survey of Vegetable Oils in Bulk

By D. A. Brett (Caleb Brett and Son, Ltd)

Calibration and tank scale weighing of oils give equally good results. The average loss on outturn would be about 0·25% over any reasonable number of shipments, depending on such factors as type of oil, viscosity, hard or soft, facilities for heating if hard, construction of vessels, tanks and pipelines, ambient temperature and skill of pumping and puddling crews. Each of the other systems —motor, tank, car, or rail car weighing, weighing drums and converting to bulk, metering —have undesirable characteristics which are difficult to overcome.

One very general error in connection with calibration is the use of a wrong basis in reporting specific gravity and/or density figures. Shipments made on the wrong basis start off with a probable loss of 0·2% and are sure to turn out badly at destination. Other major sources of error originate from lack of expert maintenance of weighing machines, and this is nearly always coupled with inadequate official testing services in the country concerned. Frequently inaccurate tank calibrations are due to wrongly placed points of measurement, coupled with tank bottom movements and sometimes because wrong measurement conversion factors have been used. Standard international volume conversion figures are now available, and few errors should arise in modern calibration work.

The major source of inaccuracy in tank calibration, whatever the system used, is human error, and to guard against this as many double checks as possible should be instituted on every movement and measurement or weighing. Oil depths in the U.K. and U.S.A. should be measured to better than 1/10th in. and 1/8th in. respectively. The metric countries work to 1 mm. or 1/25th in. and Imperial measure countries should split the tenths.

Calibration facilities should be available as a check against weighing and *vice versa*. This can be achieved by having all intermediate carrying vessels accurately calibrated and applies particularly to tank barges and tank wagons. Ships tanks cannot be used for fixing weights of oil in bulk because they are seldom calibrated to sufficient accuracy (errors of 1-3% are common) and very often the actual oil level measurement arrangements are unsatisfactory. They can be made accurate, given a certain expenditure by shipowners, and they would be an invaluable help to surveyors and eventually to owners and all concerned with the trade.

Sampling of oils sold on quality analysis basis is simple enough for oils of a completely homogenous character, but in the problems of sediments, water and dirt are always present. The main difficulty is to obtain a proper proportion of these elements in a representative bulk sample. British Standard 627:1953 lays down

sound principles. The commonest methods are either to sample a static bulk in land tank using a sample bottle or valve operated bomb type sampler, or to sample with the bulk in motion through a pipeline. Where non-homogenous oils are to be sampled a core sample should be drawn at foot levels through the bulk immediately after pumping into land tank or craft, when the oil is in a state of agitation with the moisture and impurities in general suspension. Investigation of many insurance claims for loss in weight has revealed that faulty sampling has given a false moisture content in the discharge sample, and that really there has been little or no loss of oil.

Some shipments arrive with heavy amounts of free water showing in the bulk. The free water and emulsified portion of the oil should be discharged separately, but when this is not possible then no attempt should be made to sample the bulk in tank until as much water as possible has been settled down and drawn off.

One of the best methods of sampling from the pipeline is to take a by-pass tube from the pressure valve chest of the pump. This can be adjusted to feed into a suitable container throughout the operation of the pump and ensures a good agitation of the oil at all times. Ascertainment of oil temperature is closely tied up with sampling and the accurate determination of temperature is essential to accuracy in weight calculation by calibration methods. A 1°C. error will cause weight errors in the nature of 7 per 10,000, and very much greater errors can occur in practice. A continuous record of average temperature throughout the oil movement is provided by electric continuous recorders on the tank outlet and the use of electric thermocouples placed at chosen places throughout the bulk in a tank is also worth investigation.

The cleaning of ships tanks after discharge has a very marked effect on outturn results especially with the hard oils and tallows. Design of ships tanks can greatly assist this operation. The essential tank requirements are:

A minimum of internal stringers and stiffening plates;

Ample heating coils for hard oils;

Well-placed drainage sumps;

Avoidance of large pipelines;

Adequate indication on valves as to whether they are open or shut;

Suitable coatings to ship and land tank platings;

Facilities for the efficient cleaning, emptying and drying of ships permanent pipelines.

Perishability of Foods

(Continued from p. 367)

of other transparent films commonly used for packaging, or when covered with any one of a number of preservative substances by dipping. The logical explanation of this fact is that the permeability of cellulose acetate film is such that a favourable atmosphere for inhibiting the particular type of detrimental enzyme action that is prone to take place in freshly cut asparagus is developed within a cellulose acetate wrapping containing asparagus. The air in the package when it is closed and gases given off as by-products of the physiological reactions within the asparagus contribute to this atmosphere. With numerous fruits and some other vegetables, the effects of a similar wrapping are not beneficial, as compared to no wrapping or to the types of wrapping or dipping which are not beneficial with asparagus.

Sometimes a certain type of package will be beneficial to the product in one respect and detrimental in another. For example, strawberries and peaches retain good texture longer in heat-sealed *Cellophane* bags than when not packaged, but the environments which preserve the texture destroy the flavour of the fruits.

The effects of gaseous environment within packages upon texture and flavour quality of fresh vegetables and fruits is a field wide open for study. Information now available is fragmentary, and the potentiality for benefit to the marketing of these foods appears to be great.

Dried and dehydrated foods

In dried fruits, the degradations that appear most likely to be brought about by enzyme action are browning, changes in flavour, and loss of vitamins. Browning is more serious in the cut fruits than in the whole fruits. Relative humidity in the storage atmosphere does not appear to play a major role in influencing these changes. Free oxygen probably has greater effect than humidity; therefore, containers which protect the fruit from contact with free oxygen should be beneficial.

In dehydrated vegetables, meats, and sea foods, enzymes could play a major role in accelerating rancidity, browning, other forms of flavour and colour degradation, and nutritional and textural deterioration. To avoid these reactions, these foods are either blanched or cooked before dehydrating. With the enzymes destroyed, there still remains in these foods the potentiality of degradation in storage, due to chemical reactions, which can be greatly retarded by proper packaging and by maintaining proper storage conditions. These reactions will be discussed in the next section.

Protective measures

In all packaged foods containing enzymes, enzyme action is delayed by lowering the storage temperature and protecting the food from moisture changes and from contact with free oxygen.

Protection from oxygen during freezing and drying is said to help reduce contact with free oxygen during storage of frozen and dehydrated foods. Freezing in the absence of oxygen is accomplished by freezing in a sugar solution or in oxygen-free gas. Dehydrating in absence of oxygen is accomplished by dehydrating under vacuum.

Non-enzymic chemical spoilage of foods will be discussed by Dr. Ball in the second and concluding part of his article; in particular the reaction between foods having high moisture contents and their packages. He will also consider the best means of preventing the spoilage of packaged foods, with particular stress on low temperature storage.

Advances in Food Technology

CHOCOLATE

Ultrasonic Conching

Some time ago experiments were started in Switzerland on the use of ultrasonics for conching chocolate. First results appeared to indicate drastic improvements in conching technique, including a saving of time required for the process. However, opinion is reserved on certain incidental effects which the application of ultrasonics might have on chocolate or cocoa. It is necessary to ensure that this treatment does not affect the aroma because of its depolymerisation effect. There may well be a transformation of starch into dextrines. These and other phenomena will have to be clarified by experience before the new technique can be accepted.—*Revue Technique de l'Industrie Alimentaire*, 1956, **3**, May, 53.

BISCUITS

Interaction Among Flour Components

A commercial soft-wheat pastry flour and a commercial hard-wheat bread flour were separated into four fractions — gluten, starch, "amylodextrin" and water-solubles. A dark material representing about 5% of the flour was discarded during the fractionation and was not subsequently incorporated into the reconstituted flours.

More properties of reconstituted flours, and of doughs and biscuits made from the flours were influenced by proportion than by source of the four major components: gluten, water-solubles, starch and amylodextrin.

When proportions typical of a hard-wheat flour were used, flours had higher water-absorbing power and doughs were more compressible and more elastic than when proportions typical of a soft-wheat flour were used. Biscuits were darker in crust colour, larger in volume and less tender when made from flours mixed in hard-wheat proportions than from flours mixed in soft-wheat proportions.

When the source of components varied, flours containing hard-wheat gluten had the greater sedimentation volumes. Biscuits containing hard-wheat gluten were larger and had paler and less tender crusts than biscuits containing soft-wheat gluten. Biscuits were smaller in volume and had less tender crusts and crumb when made from flour containing hard-wheat water-solubles. Biscuits had larger volumes and browner and more tender crusts when made with flour containing hard-wheat starch. Flours containing hard-wheat amylodextrin had greater sedimentation volumes, the doughs were less compressible and the biscuits were smaller in volume but had browner crusts.—M. V. Zaehringer, A. M. Briant and C. J. Personius, *Cereal Chem.*, 1956, **33**, 3, 170.

COCOA

Composition of Pod Pulp

The pulp of fresh cocoa pods has an important bearing on the primary fermentation process of the cocoa. Research carried out at the Bahia Cocoa Institute at Urucuca, Brazil, led to the following results: Rather more than three-quarters of the dry substance of the pulp consists of monosaccharides. Between 0·7 and 7% of the total sugar contents are disaccharides. One of the five main varieties of cocoa cultivated in the State of Bahia showed certain deviations. A comparison of the pulp values of Bahia cocoa with those of Sta. Lucia cocoa shows that the acid content of the former is three or four times as high as that of the latter, and that the sugar content is generally more favourable.—H. F. K. Dittmar, *Gordian*, 1956, **56**, 1334, 16.

PRESERVATION

Meat Treated with Radiation and Heat

To achieve the necessary destruction of micro-organisms while at the same time reducing the intensities of unnatural flavour resulting from ionising radiation, or the overcooking due to other conventional methods, experiments were conducted to determine the feasibility of achieving sterilisation by combining conventional preserving procedures with radiation.

Meat was freshly ground in a commercial meat packing plant, handled promptly and refrigerated. It consisted of canned ground beef, containing 85% lean and 15% fat, and canned ground pork containing 60% lean and 40% fat. A gamma ray source was used for irradiation and the meat held 2 to 3 weeks at 0°F. before taste testing. It was found that irradiation dosages from 124,200 to 993,600 rep show a linear relationship between irradiation dosage and intensity of radiation flavour of ground beef, and that the intensity of the source of gamma rays used in treating ground beef and the length of time needed to achieve a dosage of 2×10^6 rep has no effect on the extent of the development of radiation flavour. There was no significant difference in the intensity of radiation flavour produced in meat canned in atmospheres of air, vacuum or nitrogen (with the possible exception of frankfurters), between meats irradiated while in the frozen or unfrozen states, nor when meats were partially or completely cooked with or without dehydration, as compared with the same meats not so pre-treated. Combined heat treatment and irradiation did not reduce radiation (but may actually intensify it). Experienced tasters were unable to detect a significant difference in the flavour of non-irradiated

ground pork and pork irradiated with a gamma ray dosage of 2×10^6 rep.

These results suggested that the radiation flavour is one to which persons become accustomed without dislike over a period of time.—H. W. Schultz, R. F. Cain, H. C. Nordan and Bruce H. Morgan, *Food Tech.*, 1956, **10**, 5, 233.

APPLES

Infra-red Peeling

When an apple is peeled mechanically it loses from 15-18% of its weight, including some of the flesh.

Experiments made by the Canada Dept. of Agriculture show that infra-red radiation can be used successfully for apple peeling. With a heat source of about 1,520°F., exposure times of 9-30 sec. were required, depending upon the particular variety. Weight losses of the apples were about 2.5%.

The peeling unit consisted of a 6-ft. long infra-red radiant panel enclosed by a ½-in. thick insulation blanket of fibrous silica between two foils of *Inconel*. An endless belt containing steel pins for carrying the apples through the tunnel was operated manually.

A definite temperature was obtained in the tunnel by using either 3,000, 4,000 or 5,000 watt *Calrod* units. Temperatures were measured with a Leeds-Northrop potentiometer using a chromel-alumel thermocouple located at the centre of the tunnel.

Each apple, at room temperature, was pushed on to a steel pin and carried through the tunnel at a slow rate of speed. As soon as blistering was complete the apple was removed and cooled immediately in cold water.

With this laboratory-size peeling tunnel, the commercial adaptability of the infra-red peeling could not be properly evaluated. The authors suggest that the results obtained warrant further investigation on a commercial scale.—E. A. Asselbergs and W. D. Powrie. *Food Tech.*, 1956, **10** (7), 297.

MEAT

Mineral Contents and Quality

From research carried out at the German Federal Institute for Meat, Kulmbach, it appears that the mineral contents (Ca, Mg, Zn and Fe) of beef muscle are largely determined by seasonal changes in feeding. By using a novel ion-exchange method for the determination of the binding strength of polyvalent cations in muscle tissue, it was found that the binding strength, both in structural and in water-soluble muscle proteins, increases in the order Mg < Zn < Ca < Fe. It was also found that the calcium and zinc, but not the magnesium, contents reduce hydration, and that their elimination by ion exchange increases the water binding. Meat in which the Mg, Ca and Zn contents have been reduced by ion exchange is no longer subject to strong hydration through phosphates. With high *p*H, the ion binding in the meat is substantially more stable than with low *p*H. In aged meat, the binding strength of the ions in the muscle proteins is reduced. Research was also carried out on the question to what extent the extractability of Mg, Ca, Zn and Fe depends on such factors as water contents, *p*H and ageing period.—R. Hamm, *Die Fleischwirtschaft*, 1956, **8**, 340.

FLOUR

Test for Ascorbic Acid

With the recent introduction of ascorbic acid as a commercial flour improver, the need has arisen for a rapid routine test for its detection in bread flours. Promising results have been obtained with a method using Tauber's ferric-ferricyanide reagent modified to reduce the total acidity and thus lower the tendency for ferrous iron to pass into the solution.

To modify the reagent, dissolve 1 g. of ferrous sulphate in 50 ml. of water and add 10 ml. of 85% phosphoric acid. Heat to boiling and oxidise by adding a 1% solution of potassium permanganate until a faint pink colour persists. Cool, and add 20% sodium hydroxide solution until a permanent turbidity is produced. Clear the solution by cautious addition of 10% sulphuric acid, and then make up to 100 ml. and filter. Add 0·5 g. of potassium ferricyanide dissolved in 100 ml. of water and mix. The mixed reagent should be pure yellow and remains active so long as no change in colour occurs.

To test for ascorbic acid, smooth a sample of the flour on a white tile and wet it by quickly immersing the tile in water and draining. Treat the wet surface with sufficient reagent to cover completely and leave for 1 to 2 min. The presence of ascorbic acid is indicated by the appearance of bright blue spots or flecks. The modified reagent and procedure described detected 10 p.p.m. or less of ascorbic acid and was unaffected by all the commonly used improvers and enrichment materials. — K. J. Hayden, *Analyst*, 1956, **81**, 6, 376.

Substitute Foods

(*Continued from p.* 380)

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Machinery and Equipment

PRESSURE INSTRUMENTS

Pressure instruments which are said to permit pressure measurement and control over a wide range have been introduced by Honeywell-Brown Ltd. The extensive range is made possible by the variety of measuring elements: bourdon tubes, spiral, spring and bellows, extra large spring and bellows, and absolute pressure bellows.

Single-, 2-, and 3-pen recorders, single- and 2-pen recording controllers, and indicating pneumatic transmitters are among the models offered. On-off, two-, and three-term control forms can be supplied. The instruments are also available for vacuum measurement.

CIDER VINEGAR GENERATOR

Merrydown Wine Co. Ltd., manufacturers of vintage ciders, have introduced the first fully automatic plant into Britain's cider vinegar industry. It produces over 2,000 gal. of cider vinegar each week, compared with a previous production figure of only 100 gal.

Merrydown, call their new 5½% vinegar *Martlet*, and claim that it is comparable with the American and continental type vinegars which are greatly favoured in restaurants, and are now almost exclusively specified by recipe composers.

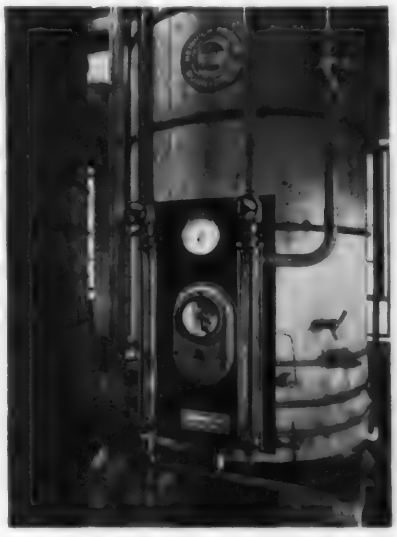
In appearance the new automatic generator is similar to the type which has been used for many years in the vinegar industry. The only noticeable difference is a panel of gauges and "flow tubes" which indicate the temperature inside the generator and the quantity of air being fed into it.

The change from cider to cider vinegar can be briefly described as the conversion of alcohol contained in cider into acid. This change is brought about by feeding the vinegar bacteria in the cider with oxygen when the correct "breeding" temperature has been reached. Both factors can be critically controlled in the automatic machine, whereas in the old type of generator the degree of conversion is left to the judgement of an experienced operator.

The time taken to complete the conversion depends upon the amount of air needed by the breeding bacteria. With the old type, or "shavings" generator, the process is slow. The automatic generator, however, feeds the correct amount of oxygen for a considerly higher rate of breeding. It is the flexible control of the air supply which makes it possible either to reduce or increase production.

After the vinegar is drawn from the generator it is left to mature for at least three months. Another improvement affecting the quality, is the preservation of ½% alcohol which keeps some of the bacteria alive during this important maturing period prior to bottling. This enhances the flavour by removing the harsh acid taste and allowing the fruit esters to predominate; the bouquet also is more pleasant. The plant was supplied by the German firm of Heinrich Frings.

All-wood starch tray.



New cider vinegar generator which can turn out 2,000 gal. per week. On the left is the old generator converted for use as a storage vat for the cider mash.

STARCH TRAY

A new "no metal" starch tray marketed by Venesta Ltd., is made entirely of wood to eliminate the danger of the entry of metal particles into confectionery products during manufacture.

The birch plywood base of the tray is press-cemented on to the hardwood sides and ends and four "feet" are glued into position by means of two ⅜ in. dowel rods. No nails are used. The sides and ends are kiln-dried to the moisture content of 14%, representing the humidity factor present in a sweets factory and combating any tendency towards distortion. Another advantage claimed for the tray is that magnetic metal detectors can be used on the production lines.

The standard tray is 32 in. by 14½ in., the internal measurements being 30½ in by 13½ in. by 1 in. deep.

MUSHROOM HANDLING

One of the range of hand-lift trucks made by The Yale and Towne Manufacturing Co. is now being used in the mushroom-growing industry.

Employing the wooden tray system of cultivation in preference to the shelf-bed method, no less than six handling operations were previously required during the heating, spawning and cropping periods. Each wooden tray, weighing some 60 lb. (2 ft. 6 in. × 1 ft. 6 in. × 6 in. deep), had to pass through two different rooms before being placed in the growing house. First of all, the tray had to be filled with specially prepared compost. It was then moved into the curing room to be "cured" by heating. After cooling, the tray was moved to an adjacent room and was spawned. A period was allowed for the spawn to run and a layer of peat was applied. The tray was finally moved to the growing house where it remained during the cropping period. In each of those operations every tray was handled singly, having to be lifted either on to or off an ordinary wheeled trolley.

Since introducing the *Yale* hand lift truck, with a load capacity of 1,000 lb., the trays have been stacked on wooden "pallets," between 12 and 16 on one pallet. The truck then lifts the palletised load and moves it from one room to the next. The trays remain on the pallet throughout the cycle of operations, except for one transfer to another pallet as the trays are being spawned.

FILLING MACHINES

The Horix filling machine, widely known in the United States is now being manufactured under licence in this country by Sheepbridge Equipment Ltd., who have given to Farrow and Jackson Ltd. the sole selling agency for this machine in the United Kingdom and Ireland.

Two classes of fillers, based on three frame sizes, comprise the range of semi-automatic and fully automatic rotary machines. There are also hand operated units and in-line semi-automatic machines. Rotary machines are available for clockwise or counter-clockwise travel.

The first class is a straight gravity filler usually equipped with a vent clean-out system to suit the products being handled. This is most suitable for heavy liquids such as catsup, edible and lubricating oils, waxes, syrup, jelly, jams, preserves, etc. It is also used for containers, such as cans, which would collapse even under a low vacuum. The second class is a low vacuum type. The vacuum employed is between 2 in. and 4 in. Hg. and is only used as a safety measure to prevent loss of drip of valuable liquids. It is not used to pull the liquid into the containers as in standard vacuum fillers, but employs the gravity system of filling within a closed vacuum. As usual with vacuum fillers unless there is a perfect sealing, filling will not take place. Thus damaged and/or imperfect containers are not filled. There is no overflow system or secondary tank, thereby avoiding aeration of the product.

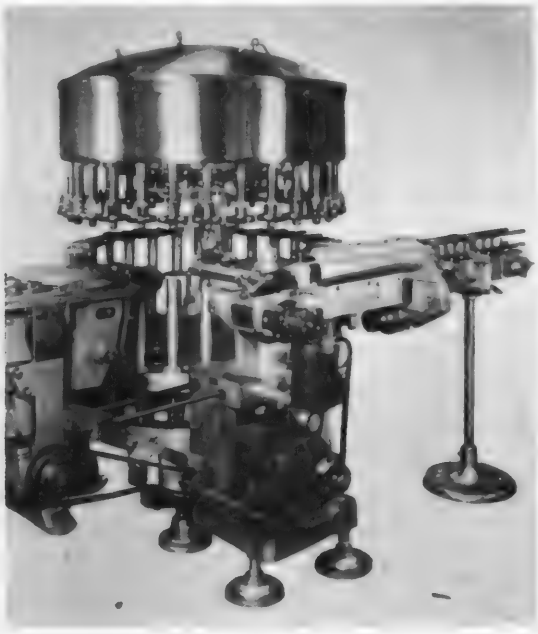
The smallest frame size is approximately 22 in. pitch dia.; the intermediate 29 in. and the large one 48 in. Assuming a maximum container, dia. say 3 in., the three sizes quoted can be fitted with up to 21, 28 and 48 heads respectively. For larger containers the proportion of heads is reduced correspondingly. The filler, which is entirely mechanical, can be fitted to handle any shape of container in general use. Individually engineered feed parts can be provided to deal with irregular-shaped containers such as, triangular or oval bottles, jars, or tumblers, and also for regular-shaped types such as squares or rectangular bottles. Valves of various types for different products are available for narrow or open mouthed containers of glass, tin, plastic or composite.

For handling cans, fillers are usually fitted with an extension shaft so that they can be driven by the can seaming machine, thereby attaining perfect synchronisation of the filling and closing units. A tangential discharge is customary as this eliminates splash from containers such as, sanitary cans, jars, etc. All machines are fitted with an automatic infeed screw which correctly times the containers into the infeed turret. This avoids hold-ups due to jamming in the infeed star wheels, and provides a steady flow which ensures smooth handling at high speeds.

Accuracy of fill is claimed to be one of the features of the Horix machines. With the latest Horix dripless valve for valuable spirits a filling height of plus or minus 1/64 in. is guaranteed.

Change-over from one size to another takes 15 to 20 min. unless the machine is fitted with valve extensions (used when there is a very great variance in height between largest or smallest container), when between 30 or 40 min. are required.

The machines can be supplied in a variety of materials. Plastic valves and contact parts are available for handling corrosive acids. Bottle preheaters to reduce thermal shock when filling hot can be supplied. A quantity of suitable feed and discharge conveyor (not exceeding 16 ft.) is built in, supplied with and driven by the filler. Thus filler feed conveyor, screw feed, filler and discharge conveyor speeds are all synchronised.



U.S. filling machine now made in Britain. This model has 28 valves and fills at the rate of 400 per min.

VENTILATING THE FOOD FAIR

A new ventilation system for the Grand Hall at Olympia, London, was completed just in time for the British Food Fair which opened there on August 28 and continues to September 15. The system has been installed by Colt Ventilation Ltd., and it provides for summer and winter ventilation by incorporating heater batteries in the air inlets. Air is drawn in through mechanical roof inflow units and extracted by natural roof extract ventilators (*see* photograph). The system passes 30 million cu. ft. of air per hr. through the building.

RUSSIANS SEE FOOD ENGINEERING WORKS

Three members of the Soviet trade delegation which recently came to Britain, paid a visit to the Crawley factory of the A.P.V. Co. Ltd. They were accompanied by Mr. Degtiariov of the Permanent Soviet Trade Delegation in London, and two interpreters. The party spent a day touring the APV factory and foundries. APV dairy equipment is known in Russia since the company is nearing the completion of a large Soviet contract obtained two years ago. In this photo the visitors are inspecting homogenisers.

TUBE HEATER

A finned tube heater combining a high rating with a large surface area has been developed by the General Electric Co. Ltd. It is said to be particularly suitable for industrial ovens and drying rooms where temperatures of 200°-350°F. are required. In natural convection ovens working between such temperatures the heater has an operating surface temperature of about 500° F.

The heater comprises a mild steel tube with a crimped gill, of 4 in. outside diameter. This tube houses a withdrawable element consisting of a spiral, operating at low temperature, carried on insulators which are assembled on a metal runner. The tube is of heavy gauge steel and weighs about 7 lb. per ft. run. A mild steel connecting box is provided at one end of the heater with a bracket for conduit entry at the base. Automatic temperature controls for controlling room or oven temperature can be supplied as required.

SAUSAGE LINKER

An electro-hydraulically operated sausage twist-linker which only requires one unskilled worker instead of three is being manufactured by Foodtech Ltd. The lid opens or closes at the press of a button, and the machine is automatically switched off when the machine is opened. The starting lever can be actuated by pressure from the operator's thigh, leaving his hands free to control the output.

The machine simultaneously performs three operations—filling, twisting and weighing—which are previously carried out separately. The makers claim that it can be set to fill from 2 to 25 sausages per lb. at the rate of 125 or 170 per min.; that it guarantees the uniformity, consistency and weight of each sausage; and that it will take hog, sheep or artificial casings. An alternative funnel can be switched on or off by a rotary valve for use with luncheon meats, etc., or for can filling.

Sausage linker which simultaneously fills, twists and weighs products.

OIL PRESS-KNEADER

The Italian firm, S.I.M.A., makers of machinery used in the production of olive oil, have introduced a new machine which combines a kneader with an oil press.

Similar kneading machines have been on the market for some time, but the S.I.M.A. system is claimed to have the advantage of stratifying the material processed on to filtering diaphragms. It also eliminates emulsion from the mass processed and drains this more quickly, making for a greater yield than that obtainable with a press alone.

The machine is of vertical type with double walls. The space between the walls is filled with water, warmed by electric heating resistors which ensure an indirect heating of the mass processed. An external thermometer permits the operators to keep an eye on the temperature inside the machine.

The internal walls and the bottom of the machine can be easily detached and replaced. The de-emulsifying blades are driven by a crown-pinion gear operating on ball-bearings and enclosed in a casing equipped with an automatic lubricating system. The machine is equipped with an automatic doser-stratificator and it is driven by a 4 h.p. motor.

The receptacle of the kneader holds from 300 to 400 kg. of paste and the operation lasts about 20 min. or more in accordance with the quality and type of olives crushed. The use of an automatic stratifier is claimed to cut the time needed for the preparation of material for pressing by 30% to 35% and facilitates the work of the operators, producing uniform strata of paste of desired thickness and width. It is also said to ensure a better squeezing out and less wear of filters.

News Digest

Flour and Bread Standards: Industry's Views Wanted

THE FOOD Standards Committee is considering whether, in addition to requirements as to the content in flour of vitamin B_1, nicotinic acid and iron, more extensive regulations governing the composition of flour and bread are needed to protect the consumer. They are inviting the co-operation of the trade, enforcing authorities and other interested bodies in their review. In the first instance they propose to consider, in consultation with other bodies responsible for advising the Government in this field, the following aspects:

(*a*) *The need for regulations governing the composition of bread.*

(*b*) *The appropriate amounts of the three nutrients to be present in flour and bread.*

The Committee will consider whether the levels of reinforcement laid down in the Flour Order and to be continued in the Flour (Composition) Regulations, should be raised in any future regulations; the levels which might be appropriate for bread; and the most suitable form and method of adding the three nutrients.

(*c*) *The present compulsory addition of calcium.*

The Committee will consider in relation to the various types of flour and in the light of nutritional evidence the case for the compulsory addition of calcium, the appropriate level of any such addition, the form and method by which it is added and whether regulations should specify the minimum amount to be added to or present in flour or the minimum amount to be present in bread.

(*d*) *The possible compulsory addition of riboflavin.*

(*e*) *The composition and labelling of special types of bread and flour.*

The Committee will consider whether special provisions are required governing the composition and/or the labelling and description of special types of flour, *e.g.*, self-raising flour, wholemeal flour, etc., and special breads, *e.g.* brown bread, milk bread, malt bread, "protein-enriched" bread, etc.

The review of the Public Health (Preservatives etc. in Food) Regulations which is being undertaken by the Preservatives Sub-Committee will cover the use of anti-mould agents, crumb-softening agents and related substances which may be added to bread. The Committee are considering whether when this review is completed it would be appropriate to invite the Sub-Committee to give consideration to other substances and processes (*e.g.* improving agents) which may be used in flour and bread.

Evidence on any of the issues set out in (*a*) to (*e*) should be sent to the Joint Secretary, Food Standards Committee, Ministry of Agriculture, Fisheries and Food, Great Westminster House, Horseferry Road, London, S.W.1, not later than October 31, 1956. Arrangements will be made for the Committee to take oral evidence at a later stage.

Bread Subsidy and Flour Composition—New Orders

On September 30 the bread subsidy ends and price control over bread is abolished. On the same day the new flour composition order comes into operation.

The bread subsidy is ended with the Bread (Amendment No. 2) Order, 1956 (S.I. 1956 No. 1181). Loaves over 10 oz. must still weigh 14 oz. or multiples thereof.

The Flour (Composition) Regulations, 1956 (S.I. 1956 No. 1183) provide that all flour intended for human consumption, whether home-produced or imported, shall on sale, offer for sale or exposure for sale, contain not less than 1·65 milligrams of iron, 0·24 mg. of vitamin B_1 and 1·60 mg. of nicotinic acid or nicotinamide per 100 grams and, except in the case of flour containing the whole of the products derived from the milling of wheat, between 235 and 390 mg. of creta praeparata per 100 g. Exemption is provided for certain purposes. The Regulations will be enforced by Food and Drugs Authorities.

The Flour (Revocation) Order, 1956 (S.I. 1956 No. 1182) revokes the Flour Order, 1953.

New standards for tomato sauce and curry

Handicaps to manufacturers of tomato sauce and curry powder have been removed by two Food Standards amendment orders which came into force on August 2. The regulations have been made by the Ministers of Agriculture and of Health and by the Secretary of State for Scotland.

The Food Standards (Tomato Ketchup) (Amendment) Regulations (S.I. 1956 No. 1167) amend Paragraph 2 of the Schedule to the Food Standards (Tomato Ketchup) Order (S.I. 1949 No. 1817). They provide for a maximum copper content of 20 p.p.m. in the whole of tomato ketchup, catsup, sauce and relish in substitution for the existing maximum of 50 p.p.m. on the total dried solids of such products.

The Food Standards (Curry Powder) (Amendment) Regulations (S.I. 1956 No. 1166) amend the Food Standards (Curry Powder) Order (S.I. 1949 No. 1816), and raise the maximum amount of lead permitted in curry powder from 10 to 20 p.p.m.

The Food Standards (Tomato Ketchup) Order requires that tomato ketchup, catsup, sauce and relish shall contain not less than 6% of tomato solids derived from tomatoes and tomato puree Tomato puree is invariable used and normally contains about 100 p.p.m. of copper. By relating the maximum copper content of 50 p.p.m. to the dried total solids the Order has compelled manufacturers to add to their products an amount of non-tomato solids equal to the weight of the tomato solids. The bulk of non-tomato solids in products of this kind consists of salt and sugar and it is not always possible or desirable to add the large quantities of these ingredients necessary to secure conformity with the limit. It was represented that the Order was a handicap to manufacturers who wished to make products containing a high proportion of tomato puree. The Food Standards Committee found no objection on health or other grounds to amendment of the Order.

The Food Standards (Curry Powder) (Amendment) Regulations have been made in view of the difficulties of manufacturers who are unable at present to ensure that all curry powder contains not more than 10 p.p.m. of lead. The raising of the limit of lead was recommended by the Food Standards Committee who were advised that the higher limit would not involve a health hazard.

News for Importers

Canned salmon.—Further quotas have been arranged for the import of canned salmon originating in and consigned from North America and Russia (*see* FOOD MANUFACTURE, September, 1955, *p.* 385) during the year ending June 30, 1957, *i.e.*:

From North America £3 million f.o.b. (£3·3 million c.i.f.)
From U.S.S.R. £1 million f.o.b. (£1·1 million c.i.f.)

The figures in brackets are the previous year's quotas.

Details are given in Notice to Importers No. 788 dated July 18, 1956, issued by the Import Licensing Branch of the Board of Trade.

Raw coffee beans.—A further quota has been arranged for the import of raw coffee beans from dollar sources (*see* FOOD MANUFACTURE, October, 1955, *p.* 429) for the year ending August 31, 1957. Details are given in Notice to Importers No. 789.

Poultry.—The Board of Trade now announce that arrangements have been made for the import from the United States of a further limited quantity of fully cooked poultry, canned or in open pack, to be purchased with dollars made available under the United States Mutual Security Act, 1954, (*see* FOOD MANUFACTURE, June, 1955, *p.* 253). Licences based on the c.i.f value of their imports will be issued to traders who imported fully cooked poultry under the arrangements announced in Notice to Importers No. 728. Details are given in Notice to Importers No. 790.

Irish food imports: New duties

The Government of the Irish Republic has imposed additional levies on certain imported manufactured foods in an effort to restrict imports.

The manufactured foods affected are: Ice-cream powders; fresh, chilled or frozen fruit, excluding apples, plums, pears, hot-house grapes and fresh strawberries; dried fruit; fresh, frozen, dried or otherwise preserved vegetables (other than tomatoes and dried peas); vegetable soups and purees and vegetable preparations consisting wholly or mainly of vegetables; fish of all kinds in sealed bottles, jars, kegs, pots, tins or cans, including roes and fish paste; cereal products described as malt extract, macaroni, spaghetti, groats and semolina; tapioca and sago; tapioca and sago substitutes obtained from potato or other starches; cornflour; meat and meat preparations including soups, extracts, essences and juices, suitable for human use; edible nuts (fresh or dried, whole, sliced, chopped, pulped, grated, peeled or shelled); chocolate and other food preparations made from or containing cocoa; pickles, sauces or mixed condiments; spices; non-alcoholic beverages, cordials, prepared fruit juices; prepared vegetable juices; essential oils and concentrates; synthetic perfume and flavouring materials.

All the goods mentioned above when imported into Ireland will be subject to an import duty of 60% unless they come from the United Kingdom and Canada, when the duty will be 40%. Canned fruits which were subject to 37½% (full) and 25% (preferential) have been increased pro rata.

OBITER DICTA

● Mr. Lionel G. Schumann has collected more than 8,000 cheese labels, and has formed the Cheese Label Collectors' Club. —*Daily Mail.*

● Who will be the popcorn man or woman of 1956? This is the $64,000 question now being asked throughout the entire popcorn industry.—*Popcorn and Concessions Association.*

● On show will be the rich liver, tinned in many varieties, of Hungarian geese, force-fed with maize till they nearly burst.—*Hungarian News and Information Service.*

● My small son is somewhat frustrated by peas which are too large for pea-shooters. One must go back to the Crimea to find such an example of lack of co-ordination in the supply of closely related items of ordnance. —*Letter to The Times.*

● The usual quarterly case of contamination of a lemonade bottle was received; on this occasion the offending material was turpentine. Unsocial behaviour of this kind appears to be a part of the fabric of modern civilisation.—*Birmingham City Analyst.*

● It is surely a gross infringement of the liberty of the subject to force him to eat foreign substances in his flour. The addition of chalk to flour may, or may not, be harmless, but what guarantee have we that some Minister will not in the future order the inclusion of something more lethal?—*Letter to The Western Mail.*

● Lord Hailsham, who had been searching the Scriptures, found nothing in the 20th chapter of Exodus to justify the attempt of the lunatic fringe there had always been in the religious world to improve on the Ten Commandments by adding "Thou shalt not bet" and "Thou shalt not drink."—*Times Parliamentary Correspondent.*

● The Government in its benevolence gives us taxes, a credit squeeze, re-rating, education and health services, and now it appears likely that its greatest achievement will be a standard sausage Mark IV—an analysed mystery—but with no mention of price.—*Delegate at National Federation of Meat Traders' Associations Conference.*

Export trade warning

West Germany's exports of food, drink and tobacco expanded during the period 1953 to 1955 by 50%, compared with the U.K.'s 15%. These, together with other figures contained in the *Board of Trade Journal*, illustrate West Germany's strengthening competition in the export market. According to the report, Germany has devoted a higher proportion of her national product to industrial investment than the U.K. Labour costs appear to have been moving in favour of Germany over the past six years, and while weekly earnings have advanced faster than output per man in the U.K., in Germany the converse has been true. In regard to export incentive schemes, the report states that from 1951 up to the end of 1955 German exporters were allowed two special direct tax reliefs, one a deferment of part of the corporation tax liability and the other a tax-free allowance, both related to export turnover.

If the German challenge is to be successfully met, says the report, British industry must pay special attention to improving its sales promotion abroad and must invest more in the modernisation and expansion of industrial capacity in this country.

Beware of booby traps

The Industrial Safety Division of the Royal Society for the Prevention of Accidents is holding its annual campaign against accidents this year during the week, November 5 to 10. It will place particular emphasis on the safe use and maintenance of hand tools, and the general slogan will be "Watch out for booby traps," which will appear on posters, in leaflets and in other forms of propaganda circulated in industry. The Society gives the latest available industrial accident figures as 185,000 injured every year and three persons killed every working day, representing, on the economic side, a loss to industry of 20 million man-days a year. Out of a labour force of 7 million in the factories of Britain, about 80,000 persons are absent from work at any one time.

Company Profits and Prospects

Zwanenberg profits up

Net profit of Zwanenberg Associated Food Companies Ltd., last year was £95,522 (£81,046), reported the chairman, Mr. I. Van Zwanenberg at their annual meeting. The organisation, which was formerly known as Zwanenberg-Organon Ltd., is to sell its pharmaceutical companies and the capital will probably be reorganised in the near future. A dividend of 8% was approved.

*

Maconochie's profits

Net profit of Maconochie Foods Ltd., and its subsidiaries in this country amount to £69,303, announced the chairman, Mr. R. S. Mays-Smith at the annual meeting. In view of the satisfactory year's trading and the company's improved position, it was decided to pay 18 months arrears of Preference dividend.

The company's South African interests are to be disposed of to Anglo-Transvaal Industries Ltd.

*

Grocery chain acquired

An important development reported by Peter Keevil and George Walker Ltd., is the re-organisation and modernisation of the 26 retail grocery shops of their new subsidiary, Hudson Brothers Ltd., acquired in February this year. They are also engaged in further extension of their Kilmarnock factory, and on its completion all activities of the Scottish companies will be centred there.

Group net profits after tax were £131,860 (£137,892).

*

Bovril's 60th year

Bovril Ltd., now in its 60th year, achieved its highest-ever sales during the past year. The chairman, Lord Luke, reported steady progress in the company's overseas trade, in spite of two extensive dock strikes.

Mechanisation in the Bovril factory had continued to make good progress and would help towards offsetting the continued rise in costs.

The group's net profit for the year was £357,977, of which £20,745 belonging to the parent company was retained in the subsidiaries. A final dividend of 13¼% on the Deferred stock was recommended, making a total of 16% for the year.

*

Virol's rebuilding plans

Virol Ltd. plan to completely rebuild their Lifton factory at a cost of over £250,000 to cope with increased demands for their products. The chairman, Lord Luke, said that it was hoped to commence building in 12 months' time. Substantial profits would have to be retained to assist in financing the work.

Sales of the company's subsidiary, Ambrosia, rose substantially during the year to March 31, 1956, reflected in the increase from £112,034 to £272,641 in group trading profits. Sales of Virol were still quite good, but demand was falling. Group net profits rose to £105,673 (£58,877) after higher tax and pension provisions, but before crediting profits of £14,885 (£21,896) on assets and investments sales. The 20% less tax dividend represents an effective increase of 5% and there is a 7½%, not taxable, capital profits distribution.

*

Smith's Crisps pay 37½%

Capital developments by Smith's Potato Crisps Ltd., during last year included the completion of the company's new Newcastle factory and the building of a new depot at Middlesbrough, reported the chairman, Mr. F. Le Neve-Foster, at the annual meeting. The company is also considering the erection of a new factory in the Midlands and a decision on this project will probably be taken during the year. On their farming estate the company has started the erection of one of the largest grain drying and conditioning plants with storage facilities in the country. The new plant will have an additional capacity at the rate of 16 tons an hour and will provide a storage capacity — including what Smith's already have at their mill—for 1,800 tons of grain. The building and plant have been completed and should be ready to deal with the coming harvest.

Net profit of the group is £276,593 against £214,138, a net increase of £62,455. A final dividend of 25% plus a cash bonus of 5% making with the interim a total of 37½% was made. This is an effective increase of an additional 8%.

*

End of bread subsidy will help Hovis

Speaking at the company's annual meeting, Mr. J. F. Morton, chairman of Hovis, Ltd., said that the reduction in bread consumption last year is reflected in a lower demand for white flour but that as a result of forceful and informative advertising this applies only very slightly to *Hovis* flour. The organisation's turnover in all milling products has risen to over £10 million. The net profit was £300,751.

As *Hovis* is unsubsidised, the end of the bread subsidy will remove the last price distinctions. The company will do its utmost to stabilise prices.

A total Ordinary dividend of 12½% was made.

Bush profits lower

"Intensive competition" cut the profits of W. J. Bush and Co. Ltd., from £271,618 in 1954 to £245,339 in 1955, even though turnover had increased, reported the chairman, Mr. Eric L. Bush at the company's annual meeting.

An offer has been received to buy one of the company's overseas assets, but no further information can be given at this stage. The company's development programme involved the expenditure of £144,449 on fixed assets at home and abroad during the year. New premises at Isando, near Johannesburg, were fully occupied during the year.

A final Ordinary dividend of 12½%, making 15% for the year, was made.

*

Energen may start U.S. factory

Sales of *Energen* rolls, breakfast flakes and biscuits in North America rose by 20% last year, and so impressed are the directors of Energen Foods Ltd. by the demand for their products in the U.S.A. and Canada that they are considering the establishment of a factory in America. Further extensions are to be made at the company's Ashford works.

In spite of record demand for their products at both home and abroad, the company's profit was reduced to £76,056 from £90,606. "The reason for this can be summed up in one word," said the chairman, Mr. W. A. Bennett, at the annual meeting, "Strikes." Between them the railway and the dock strike last year cost the company nearly £20,000.

A final dividend of 12½% making 20% for the year was made.

Laboratory ware prices

Member firms of the British Laboratory Ware Association Ltd., have agreed to peg the prices of their products for six months from September 1. Non-members have been asked to support their policy of price stabilisation which applies to home and overseas prices.

I.C.I.'s price freeze

Imperial Chemical Industries have frozen the prices of a wide range of products until at least June 30, 1957. They undertake not to raise the home trade prices of their chemicals, dyestuffs, explosives, fertilisers, fibres, paints, pharmaceuticals, and plastics, "provided no unexpected or exceptional factors intervene, and provided the company does not incur any major increase in the cost of freight or fuel before that date."

I.C.I. have made this gesture in response to the recommendations of the F.B.I. and other bodies. The company

says that their home trade selling prices have advanced by only two-thirds since 1946, although the purchase index for their raw materials has increased to 2¼ times the level in 1946, and over the same period the I.C.I. index of earnings per employee of all grades has doubled.

Distillers peg prices

The Distillers Co., and its subsidiaries have undertaken to hold their present home market prices firm "at least to the end of 1956." The policy is subject only to circumstances beyond the company's control, "such as increases in the cost of raw materials, fuel and carriage."

Dearer jam

The high cost of soft fruit this season has raised the prices of some jams. James Robertson and Sons have increased their blackcurrant jams and jellies by 3d. per lb. and their raspberry and strawberry jams by 1d.

Chivers have increased their strawberry jam by 1d. per lb., raspberry by 1½d., and blackcurrant by 4d.

Brown and Polson group name

All British operations of the three member companies of the Brown and Polson Group—Corn Products Co. Ltd., Feculose Co. Ltd., and Farina Dextrin Ltd.—are now conducted under the name Brown and Polson Ltd.

The users in 80 different industries of the starch and glucose products manufactured by the group will be dealing in future with Brown and Polson Ltd. (Industrial Products Division).

This is purely an administrative change and personal contacts with customers will remain unchanged.

Scottish products display

The Scottish Council (Development and Industry) recently held a composite exhibition of Scottish foodstuffs and other products at their London Trade Centre. Among food firms exhibiting at the display, which was organised by Selim Homsy and Co., Ltd., was Carrick Cereals Ltd., whose product, *Carrick Cereals* pre-cooked porridge oats was shown in London for the first time. The porridge which requires only the addition of hot water and can, where desired, be eaten raw, is the result of 20 years' research on the part of its makers and is the only porridge cereal of its kind. Other food firms represented were W. A. Baxter and Sons, Ltd. (tinned soups, jams, etc.), St. Clair Fisheries (frozen fish) and John Walker and Co. (Sugar Refiners) Ltd. (golden syrup and treacle).

Erections and Extensions

P. and H. Bakeries, Ltd., are planning to erect a bakery on a two-acre site at Park Wood Trading Estate, Sutton Road, Maidstone.

■

United Yeast Co., Ltd., propose building a two-storey office block, warehouse and canteen at Paston Road, Northenden, Manchester.

■

H. Connell and Co., Ltd., mineral water manufacturers, are planning an extension to the factory in Baltic Lane, Glasgow, S.E.

■

Isle of Wight Creameries, Ltd., 21a, Thomas Square, Newport, Isle of Wight, are extending their premises at an estimated cost of £32,000.

■

Union International Co., Ltd., Smithfield, London, E.C.1, are having a meat factory built at Albert Basin, Newry, N. Ireland.

■

T. Appleton, Ltd., propose building extensions to their bakery in Stonehouse Street, Middlesbrough.

■

Erimus Ice Cream Co., Ltd., are planning to extend their factory in Longlands Road, Middlesbrough.

■

Louis C. Edwards and Sons (Manchester), Ltd., are planning to erect extensions to their meat processing factory in New Street, Miles Platting, Manchester.

■

Warburton's Bakery, Ltd., have had plans prepared for the proposed erection of extensions to their bakery in Hardcastle Street, Bolton, Lancs.

■

William Bros. Direct Supply Stores, Ltd., have had plans drawn up for the proposed building of a bacon factory and warehouse on a site at Hainault Industrial Estate, Dagenham, Essex.

■

Beecham Foods, Ltd., plan to build a depot, offices and canteen at Vicars Lane, Newcastle-on-Tyne.

■

Quality Foods, Ltd., have plans in hand for the construction of a £15,000 extension to their premises in Park Avenue, London, N.W.10.

■

Cadbury Brothers, Ltd., have plans in hand for the construction of two silos at their factory in Pasture Road, Moreton, Wallasey.

Egg marketing plan report

A number of important modifications to the British egg marketing scheme, sponsored by the National Farmers' Union, are recommended by Mr. G. G. Baker, Q.C. in his recently published report. Mr. Baker suggests that the number of birds which would be exempt from registration under the proposed Board should be raised from 25 to 50. He added that if his other two main proposals were rejected, the number should be raised to 100. These proposals were that all forms of direct sale by producers (except possibly to hotels, hospitals and restaurants) should be allowed, providing producers have a licence from the proposed Board, without their having to grade, test and stamp the eggs. Secondly, that producers should be allowed to sell direct to retail shops subject to the Board's sanction.

Mr. Baker's finding was that the case in favour of competition, as against the compulsory registration and controlled sales advocated by the scheme, was overwhelming.

The report is being considered by the Minister of Agriculture, the Home Secretary and the Secretary of State for Scotland. If the changes are accepted by the ministers and the N.F.U. and the revised scheme gains Parliamentary approval, it will still need a two-thirds majority vote by poultry keepers. If the three farmers' unions cannot agree to the changes, however, the scheme will be dropped.

Fishing fleet modernisation

Government plans to help modernise the fishing fleet were recently outlined in Parliament by Mr. Heathcoat Amory, Minister of Agriculture and Fisheries.

There was no intention, he said, of initiating a permanent subsidy or a regular yearly increase in the subsidy, but he proposed to increase the £7·5 million subsidy granted in 1953, and which would shortly be expended, by £2·5 million. This was expected to last until July, 1957, when the present scheme expired.

"The decline in the number of steam vessels must not be allowed to get out of hand," Mr. Amory declared. "The object of the White Fish subsidy is to enable us to keep control of the rate of changeover to the new modern vessels."

The additional cost of the subsidy for steam vessels amounted to £650,000 a year, bringing the total for such ships to about £2m. a year. But even this considerable addition would not enable many of the steam vessels to operate without loss, the Minister suggested.

For motor-trawlers the rise in costs had been less serious, he contended. The motor-trawlers were expected eventually to become completely self-supporting.

People

MR. CHARLES E. M. HARDIE has been appointed a director of Crosse and Blackwell (Holdings) Ltd.

MR. ARTHUR H. NEVILLE has been appointed senior representative of Coates and Co. (Plymouth), distillers of Plymouth Gin.

SIR GEORGE DUNNETT, a deputy secretary with the Ministry of Agriculture, Fisheries and Food, has been appointed chairman of the Sugar Board.

MR. G. A. DUMMETT, M.A., A.M.I. CHEM.E., was elected to the board of the A.P.V. Co. Ltd. on July 25. He joined the company in 1935 and has successively been laboratory manager and scientific manager.

MR. P. J. BROWNILL has been appointed divisional manager for the north west sales division of Batchelors Peas Ltd. Mr. Brownill, who is 43 years of age, has been the company's sales manager for Liverpool.

MR. J. M. ELLIOTT has been appointed manager of Smedley's Barming, Kent, factory. Mr. Elliott, who is 42, has been with Smedley's since 1952 as an assistant manager. Before joining Smedley's he spent 6 years with H. J. Heinz and Co. During the war he served with the 14th Army in Burma.

MR. WILLIAM G. PROCTER has been appointed to the Board of Fisons Milk Products, a member of the Fisons Group. Mr. Procter has recently been promoted to the post of unit manager at the Coleraine Milk Factory, Northern Ireland, in place of MR. C. F. STENSON, who has left the Fisons Group and resigned his Board appointments.

MR. R. MAYHEW has resigned from the board of Fillery's Toffees. He has been managing director since the company was started, and chairman since 1951. MR. MAURICE L. WELLS, who has been managing director since 1928, retires from that position and has been appointed as the new chairman. He will also act as general consultant. MR. NORMAN G. LANCASTER, who has been assistant managing director for two years, has been appointed managing director in place of Mr. Wells.

MR. W. CLIFFORD ATKINS, who has been a director since 1928, has been appointed deputy chairman. MR. NORMAN T. ATKINS and MR. ROBERT C. MAYHEW have been elected to the board of the company.

MR. MICHAEL SMEDLEY has been appointed chief personnel officer at Smedley's Ltd. He takes charge of labour recruitment for the group and the administration of apprentice and trainee schemes. At the same time, he continues as deputy works manager of the firm's Wisbech factory. Mr. Smedley, who is 26, is the elder son of Mr. Wallace Smedley, chairman of the national canning group of companies.

Bacteriologists in conference

The annual meeting and summer conference of the Society for Applied Bacteriology was held in Reading University on July 16-18.

The following officers were elected: *President*: Dr. M. Ingram (Cambridge); *Secretary*: Mr. G. Sykes (Boots Pure Drug Co. Ltd., Nottingham); *Treasurer*: Mr. C. S. Miles.

Visits were paid to the National Institute for Research in Dairying, Shinfield, to the Agricultural Research Station, Compton, and to the Microbiological Research Establishment, Porton.

Research at Long Ashton

In a series of four papers on acidity changes in cider fermentation in the annual report of Long Ashton research station, F. W. Beech and A. Pollard discuss the aspects of practical importance to the cider maker: they show sulphiting to be advantageous with low-acid juices but less necessary with high-acid juices. J. G. Carr and G. C. Whiting describe the effects of *p*H on the growth and metabolism of *lactobacilli* in apple juices; F. W. Beech, L. F. Burroughs and G. C. Whiting follow the changes during the storage of juices and dry ciders to which varying amounts of sulphur dioxide have been added, and L. F. Burroughs shows the deleterious effects of yeast autolysis that may occur when low-acid ciders are left in contact with their lees.

Experiments on domestic food preservation are also reported.

A Crang and M. Sturdy give the results of three years tests of the processing qualities of varieties of peas and beans. The same authors report on bottling and freezing tests on 14 varieties of raspberries and 9 of strawberries, and bottling trials on 8 varieties of pears.

Investigations by M. Sturdy and A. Crang on the quality of deep-frozen pork and pork products have shown the need for adequate wrapping to prevent freezer-burn and rancidity: greaseproof paper was found to be an unsuitable wrapping material. Rancidity was induced in sausages by the addition of salt before freezing and in joints by prolonging the period between killing and freezing.

Meetings

Food Group—Society of Chemical Industry

YEAST SYMPOSIUM

Joint meeting of the Dublin section and Food and Microbiology groups on "Recent Studies in Yeast and Their Significance in Industry" to be held in Dublin, September 17-9.

Monday, September 17. Opening remarks by Sir Richard Levinge. "Some Chemical Aspects of Yeast Growth," by Dr. A. A. Eddy. "The Respiration and Growth of Yeast," by Dr. R. Slonimski. "Fat Production by Inositol Deficient Yeasts," by Dr. S. W. Challinor. "Amylase Systems in Brewery Yeasts," by Prof. R. H. Hopkins. "Yeast Control in Cider Fermentation," by F. W. Beech.

Tuesday, September 18. "The Regulation of Carbohydrate Metabolism in Yeast Cells," by Dr. H. H. Holzar. "The Measurement of Levels of Metabolites within the Yeast Cell During Fermentation," by P. F. E. Mann, W. E. Trevellyan and J. S. Harrison. "Active Transport Across the Yeast Cell Membrane," by Prof. E. J. Conway. Film: Life Cycle of a Yeast Cell. "Yeast Genetics in Industry," by Mr. R. B. Gilliland. "Some Genetic Aspects of Panary Fermentation," by R. R. Fowell.

Wednesday, September 19. "The Utilisation of Flow Sugars During Panary Fermentation," by R. M. McKenzie. "The Influence of Enviromental Factors on Yeast Behaviour," by Dr. J. White. Final Discussion. Summaries: The Brewing Industry—Dr. A. H. Cook.

Time for discussion will be allowed on all papers. A dinner will be held on September 18, and a visit will be arranged Wednesday afternoon.

Wednesday, October 4. Joint Meeting with the Bristol Section of the Society of Chemical Industry. Dr. E. H. Callow, Head of the Meat Division, Food Investigation Organisation, D.S.I.R., on "The Nature of Meat." 7 p.m. University Chemical Department, Woodland Road, Bristol, 8.

Thursday, October 5. Joint Meeting with the Glasgow Section and Oils and Fats Group. "Industrial World Varieties of Oils, Fats and Emulsifiers for Edible Purposes," by Dr. Sven Young. Royal Technical College, Glasgow, 7 p.m.

Wednesday, October 10. Ordinary Meeting of the Group. 1. "The Chromatographic Determination of Sugar and Oligosaccharides in Starch Hydrolysates," by D. M. Ireland, B.SC. 2. "The Natural Ageing of Flour," by J. B. M. Coppock, B.SC., PH.D., F.R.I.C. and Ruth Bennett, B.SC. The Society's meeting room, 14, Belgrave Square, London, S.W.1, 6.45 p.m.

Food News Overseas

Siamese tapioca flour

A tapioca flour plant is being erected at Rayong, Thailand, 200 kilometres south-east of Bangkok, and will shortly go into production. Output will be about 65 tons of tapioca flour a day on a 24-hr. basis, necessitating some 100 tons of tapioca roots.

Canadian sugar beet shortage

Lack of sugar beet has forced the Canada and Dominion Sugar Co., to close its plant at Wallaceburg, Ontario, for the first time in 54 years, excepting the war-time sugar control period. Mr. W. J. McGregor, president of the company (in which Tate and Lyle Investments Ltd., have the largest holding), stated that only 14,000 acres were grown, barely enough to operate the company's large Chatham, Ontario, plant at 50% capacity.

Australian rice development plans

Territory Rice, the company formed two years ago, by Australian and American interests, plans to start next year on a £A1·4 million project to build a rice mill of the latest design, "to put Darwin into the rice exporting business on a global scale." The mill should be running by May 1958.

The Australian Government has made a 30-year agreement to hand over between 500,000 and 750,000 acres for the development of rice growing in the Northern Territory to the company who will spend nearly £A5 million to launch the project.

Already very successful rice-growing experiments have been made in the area. The company's properties will extend over sub-coastal plains from East Darwin to the Arnhem Land border.

Australian dairy report

Special milk powders possessing some of the properties of egg-white have been produced under commercial conditions in batches of several tons and marketed. This, and other projects including studies on the flavour chemistry of dairy foods and cheese starter investigations, is contained in the annual report for 1954 and 1955 of the Dairy Research Section of the Australian Commonwealth Scientific and Industrial Research Organisation. Another achievement was the stability of vitamin A in non-fat milk powder, using hydrogenated coconut oil as a vehicle and adding edible antioxidants.

Studies on new methods of cheese manufacture have been directed to the influence of *p*H and moisture in the cheese after pressing on the subsequent ripening of the cheese; to the role of the ordinary starter and of *Str. durans* in controlling *p*H; to the optimum cooking temperature; to the retention of calcium salts and of lactose; and to the precise treatment to which the curd must be subjected to give the desired physical properties. The latter information is needed as a basis for the studies on the mechanisation of the process which are now proceeding.

At the end of 1955, the section moved into new laboratory and pilot plant buildings at Highett, Victoria, and a major acquisition was the 400-tube freeze-dryer which made possible the preparation of cheese starter cultures for distribution to cheese factories throughout Australia.

Soluble coffee plant

A $750,000 soluble coffee plant, owned by Cia Products de Cafe S.A., was officially opened recently by the President of El Salvador. The normal product is being sold locally under the name *Listo* while a blender product is being flown to a soluble coffee manufacturing company in the U.S.A. for blending purposes. At the time of the inauguration nearly 70,000 lb. had been shipped to the U.S. company which holds one-third of the capital of the Salvadorean company and which is expected to buy most of the output of this special blending type.

The Salvadorean Government has recently concluded an agreement with U.N.I.C.E.F. for the erection of a dried milk factory at San Miguel. The products of this factory will be used in schools.

Fifty years of the Food, Drug and Cosmetics Act

The 50th anniversary of the Food, Drug and Cosmetics Act is being celebrated in the U.S. Commemorative stamps have been issued with a special "First Date of Issue" cancellation by the Washington, D.C. Post Office. We have received one of these attractive stamps from Fritzsche Bros., Inc., the essential oil manufacturers of New York. Fritzsche are also celebrating a notable birthday this year. They are 85.

£300,000 sugar factory for India

A cane sugar factory crushing 600 tons of cane a day is being built for the National Sugar Mills of Calcutta at Ahmedpur, West Bengal. The contract, worth £300,000 has been placed with Duncan Stewart and Co. Ltd., a Glasgow firm.

Indian skimmed milk plants

Two skimmed milk plants are being built in Calcutta and Madras under the auspices of the Food and Agriculture Organisation. Five countries—Australia, Canada, the U.S.A., the Netherlands and New Zealand—are providing a total of $504,000 of which $490,000 is being spent on the plant in Calcutta and the balance in Madras. Proposals for another plant in Poona are being considered by the Union Government.

Dairy development project

Under the Technical Co-operation Programme between the Governments of India and the United States of America, an agreement covering a project for the control of dairy development was recently signed in New Delhi.

The purpose of this project is to provide technical assistance in increasing the quality and supply of milk and milk products, improving the diet, affording additional income to cultivators, and helping in the stabilisation of prices through the provision of milk drying plants for the processing of excess milk at certain periods of the year. It is designed to assist the Government of India in its dairy development programme to be undertaken during the Second Five Year Plan.

Under the project, the International Co-operation Administration will make available $300,000 of technical assistance funds for the purpose of procuring from outside India various items of scientific supplies for training and demonstration purposes, for one milk drying plant and associated rural collection centres, three rural creameries to be located at Moonar, Raigarh and Udgir, and other co-operative milk union plants. The equipment to be installed in these plants will be utilised in the training of a portion of the personnel required for the management and operation of the plants proposed to be established for the Second Five Year Plan.

The Government of India will provide Rs.240 million for the implementation of the programme.

Overseas Enquiries

Germany: confectionery

Kiddy Kaugummi Co. G.m.b.H., Koeln-Braunsfeld, Haselbergstrasse 23, wish to contact British firms who wish to export confectionery, particularly novelties, to Germany. They are more interested in lines which can achieve mass sales than in expensive high quality sweets with a more limited appeal.

Interested suppliers should write direct to Kiddy Kaugummi Co. G.m.b.H., at the same time notifying the British Consulate-General, Duesseldorf 10, Cecilien Allee 16, that they have done so.

Tangier: confectionery

Mr. Jacques M. Eljarrat, 23, Rue de Foucauld, Tangier, wishes to import from the U.K. inexpensive confectionery of the type that is easily handled on trays in cinemas, at football matches, etc. He will work this in conjunction with the sale of ice-cream; he has already a good market for the latter.

Interested manufacturers should write direct to Mr. Eljarrat, at the same time notifying the British Consulate-General, 52 Rue d'Angleterre, Tangier, that they have done so.

U.S.A.: confectionery

Mr. Jack Herdan of Honey Crisp Candy Co., 126, West Kinzie Street, Chicago 10, would like to buy hard candy (boiled sweets) from British firms. This confectionery should be offered in bulk quantities in mixed flavours and each piece should be wrapped in cellulose transparent wrapping. The confectionery need not necessarily carry a brand name.

Interested suppliers should write by air mail direct to Mr. Herdan quoting c.i.f. Chicago prices in U.S. currency, at the same time sending copies of their initial correspondence to the British Consulate-General, Commercial Department, 720 N. Michigan Avenue, Chicago 11, Illinois.

British East Africa: foodstuffs, confectionery

Shah Kachra Jivraj, P.O. Box 883, Nairobi, wish to represent, on a commission basis, British suppliers of canned foodstuffs, ground almonds packed in tins, dates and confectionery (*e.g.* lollipops, sugar pigs, etc., and confectionery novelties).

A U.K. agency is already held for boiled sweets, toffees and caramels.

Interested suppliers should write direct to Shah Kachra Jivraj, at the same time notifying the U.K. Trade Commissioner in East Africa, Memorial Hall (P.O. Box 220), Nairobi, Kenya.

Technical Press Review —September

Dairy Engineering. — In-crate Bottle Washing and Milk Treatment; A Roller Drying Plant in Australia; A Second Bulk Milk Collection Scheme for Scotland; Plastic Tankers for Milk Transport.

World Crops.—Solar Energy, 1; Improved USDA-34, A Better Sweet Corn for the Tropics; The Work of the Colonial Development Corporation; Orchard Equipment.

Manufacturing Chemist.—Instrumentation and Work Study, 2; A Critical Survey of Automatic Titrators; Application of Chelating Agents; Aspects of Esterification.

Chemical and Process Engineering.—Fractional Distillation; Benzole Recovery; Coal a Useful Source of Metals?; Coal Chemicals in France: A Complete Gasification Plant Installation in Britain; New-Type Solvent-Effluent Contactor in U.S. Phenol Recovery; Mechanised Mica Production.

Corrosion Technology.—The Cost of Corrosion; The Corrosion of Aluminium in Proximity with Iron; A Gaseous System of Corrosion Control; Russian Experience in Protecting Heat Exchangers from Aqueous Corrosion.

Paint Manufacture.—Polyepoxide Resins, 2; Styrenated Alkyd Industrial Finishes—The Experiences of a User; Isobutyl Alcohol and its Esters in Coatings.

Building Materials.—Tests for Building Materials—Some of the Problems; Oil-fired Equipment for Space Heating.

Floors.—Concrete Floor Finishes; Noise Dampening and Chemical Resisting Concrete-Type Industrial Floors.

Muck-Shifter.—The New Harbour at Shoreham; Developments in Dredging.

Fibres.—Heat Effects on Tensile Properties of Textiles; Vinyl Yarns and Fibres; Courtaulds Use-Development Organisation; MR 3 Ring Spinning Frame; The World's Most Modern Thread Finishing Plant.

Atomics. — Radioisotopes — their Use in the Textile Industry; U.K. Atomic Energy Authority—2nd Annual Report; Nuclear Power for Commercial Vessels, 4.

Textiles in Industry.—Microbiological Evaluation of Rot-proofing Treatments.

Petroleum.—Advances in Ethylene Production, 2; Hydrogen Attack On Mild Steel Equipment.

Booklets Received

★Six pages of news letters from their overseas companies are included in the house magazine, *Drawdown*, of Coates Brothers and Co. Ltd. The magazine also gives a thorough coverage of the usual departmental, personal, social and sports items and is copiously illustrated.

★A range of butter and cream flavours is described in a new booklet distributed by W. J. Bush and Co. Ltd. Under the title of *Buttabelle*, the name of one of the company's established flavourings, the booklet gives details of eleven butter and six cream flavours available, together with price lists.

★The growing tendency for manufacturers of butter, margarine, and cooking fats to use aluminium-foil wraps is emphasised in a new booklet published by Venesta Ltd. The booklet shows laminated foil, used for wrapping fats, and has sections on the properties of foil and its manufacture, and also a table of coverage.

★Up-to-date information and some new photographs of their range of pumps for corrosive liquids is contained in a new leaflet (No. 286A) issued by Kestner Evaporator and Engineering Co. Ltd. Another leaflet (No. 298) describes six heating systems supplied by the firm for use with general process plant.

★A booklet produced in the form of a jotting pad is issued by Advita Ltd. It lists the firm's products under a series of indented page headings, each a different colour for easy reference. Headings are: emulsifiers, vitamins for human foodstuffs, vitamins for animal feeding stuffs, and colouring materials.

★As suggested in their titles, *The Visible Packaging of Meat* and *The Visible Packaging of Poultry*, two new booklets issued by British Cellophane Ltd., advise on the packaging of meat and poultry in *Cellophane* film. Starting with the initial selection of the right film for the type of product, the booklets cover the preparation of the food to be packed and methods of wrapping and labelling, and also include guides on packaging equipment.

★A wide selection of the bottle washing and rinsing machines manufactured by The Thomas Hill Engineering Co. (Hull) Ltd., are described in seven new leaflets issued by the company. Equipment covered in the leaflets is as follows: the *Grangemouth* oil bottle washing machine, *Wasp* and *Swift* bottle brushing machines, *Grangemouth* hydro (for used bottles), *Speke* Mark 2 fully automatic vial cleaning machine, single jet rinsers for bottles and *Amprinser* for ampoules, laboratory and hospital glassware washing machines and the *Grangemouth* rinsers for new bottles.

Packaging

Stronger cellulose tape

Cellulose tape reinforced with rayon thread is now available in 500 yd. and 1,000 yd. reels from John Gosheron and Co., Ltd., to fit their standard tape dispensers. Called *Tielon*, the tape can be printed with advertising messages, name products, etc., in a wide variety of colours.

Pre-packaged, quick-frozen meat

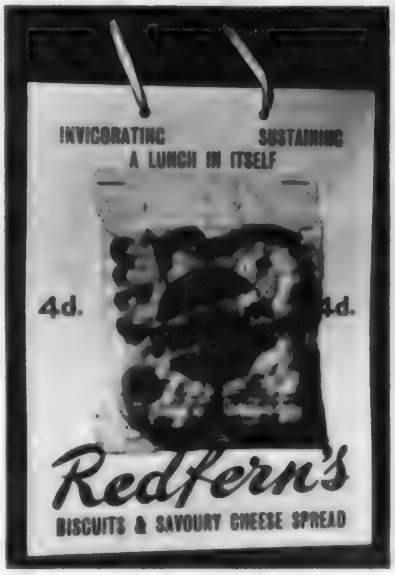
W. B. Wright (Provisions) Ltd., of Kettering, have launched a range of pre-packaged quick-frozen meat. All cuts are presented in aluminium-foil or fibre trays overwrapped with *Cellophane*. By supplying pre-packaged meat, quick-frozen and distributed in ordinary non-refrigerated vans, Wright's allow the retailer to build up stocks and thus ensure uniformity of price and supply in his shop.

To win housewives' confidence for the range it is essential that they can pick up the pack and see every detail of the meat. On the other hand, quick-freezing may cause the meat to lose weight and quality through desiccation ("freezer-burn") and develop rancidity from exposure to the air.

Tests were made with the special type of moisture-proof *Cellophane* developed by British Cellophane Ltd. Packs containing popular cuts of meat were overwrapped with it, quick-frozen, and their weights then compared with those of similar packs which had been refrigerated without protective wrappings. Whereas the wrapped packs were unaffected, a significant loss in weight through quick-freezing was noted in the unwrapped meat. After being stored in fibre-board cartons for 15 hr. at 0°F. (−18°C.), the packs were transported, under non-refrigerated conditions, to the meat department of a London store. On arrival the cartons were stored for 2 hr. at shop temperature and the packs then put in the display cabinet at a temperature of 35°−40°F. (1·6°−4·4°C.).

The following observations were made. Most packs were sold within 4 hr. of being put on display and no discoloration of meat had occurred up to the time of sale. When first displayed, there was a considerable amount of frost inside the packs which had been wrapped before freezing, mainly on the parts of the film not in direct contact with the meat. This frost did not detract from the saleability of the packs, however, and it disappeared under display conditions. There was no frost inside the packs which had been overwrapped with film after freezing, but these wraps were neither as tight nor as attractive as those on the other packs, and the meat had lost weight during refrigeration.

J. Harradine and Sons Ltd., manufacturers of edible cake decorations, have added to the blue and black display cartons another attractive outer, in the family tradition, for sugar strands. The decorations, formerly packed in tubes are now presented in film-window-bags printed in three colours.



QUICK SNACK PACK

A new "help yourself" type of pack to meet the increasing demand for the quick snack, is the biscuit and savoury cheese spread compact of R. W. Redfern Ltd.

The pack has an attractive wrap of moistureproof *Diophane* cellulose film 300 gauge, which is claimed to keep the contents fresh for an indefinite period. The wrapper, printed gravure in orange and brown, was designed and manufactured by Clearpack Ltd. a subsidiary company of Transparent Paper Ltd.

Quick-frozen meat portions in food trays wrapped with cellulose film.

New food packs are a dustman's problem

New developments in packaging foods will be among the factors which will revolutionise the dustman's job in the next few decades, according to Mr. R. G. Totty, addressing the Institute of Public Cleansing.

Mr. Totty forecast that glass bottles will eventually almost disappear because of the production of new plastics capable of withstanding acids. In 20 years milk will virtually all be wrapped in paper cartons or some similar material. Bottled beer will give way to canned in a very short time, but Mr. Totty suggests, the ultimate result will be beer in plastic containers.

The tendency to wrap and pack more and more means that the volume of refuse will increase. We could eventually have a class of refuse which will resist decomposition, so that a refuse tip of such material could not possibly be consolidated, and whose destruction by incineration will require terrific heat and create quite an odour. The only answer in Mr. Totty's opinion, is more efficient recovery.

New Companies

Aerota Packing Co., Ltd. (562442.) 7, Tithebarn Street, Liverpool, 2. To take over business of food merchants, dealers and packers and general packagers carried on as "Aerota Packing Co." and "Alexander Brown and Co." at Liverpool. £7,500. Dirs.: W. Henry, Mrs. B. W. and W. Herbert Lloyd.

John Atherton and Co., Ltd. (564761.) Importers and exporters of, merchants and agents for and dealers in raw and semi-manufactured materials and products for the food trades. £500. Subs.: J. Atherton, 54, Davyhulme Road, East, Stretford, Manchester, and Mrs. G. M. Wilson.

J. Bachner and Co., Ltd. (564568.) Mfrs. of and dealers in sausages, meat, pork and other pies. £1,000. Dirs.: J. Bachner, 26, Hyde Park Gardens, London, W.2, and Z. Hillmore.

Clarendon Confectionery Co., Ltd. (564531.) 2, Fawn Hill Parade, Brixton Hill, London, S.W.2. £500. Dirs.: J. S. Laughlin and A. D. Batten.

Container Recovery Service, Ltd. (564276.) 26, Wyre Grove, Edgware, Middlesex. Mfrs. of and dealers in packing and packaging materials and containers, etc. £100. Dirs.: E. A. and A. W. Lamb.

Danish Meat Packing Co., Ltd. (564080.) £100. Subs.: D. Ulf-Hanson, 58d, Kings Road, Richmond, Surrey, and H. J. D. H. Dunglinson.

Flip, Ltd. (564559.) Mfrs. of and dealers in flavours for use in drinks and foods, etc. £100. Subs.: E. Hack, Silver Haven, South Border, Purley, Surrey, Miss P. F. Brown, Mrs. T. Warder.

Jongrene Gelatine Co., Ltd. (563066.) £100. Dir.: W. J. F. Hillier, 15, Devonshire Gardens, London, N.21.

Kaye Meat Agencies, Ltd. (563857.) 14, Robert Adam Street, Baker Street, London, W.1. Dealers in meat. £100. Dirs.: J. and C. S. Phillips, H. Kozlowska.

Larkswood Confectionery, Co., Ltd. (562269.) 100, Great Portland Street, London, W.1. £100. Dirs.: M. Landy and S. Watson.

Linfields (Canners and Growers), Ltd. (564376.) Chesswood Nurseries, Thakeham, Sussex. Canners and growers of and dealers in mushrooms and consumable and perishable articles. £5,000. Dirs.: A. G. and J. A. Linfield.

Pickle and Sauce Manufacturers (South London), Ltd. (564465.) 7 and 8, Norfolk Street, Strand, London, W.C.2. £1,000. Dirs.: J. W., J., H. and Doris E. Marshall.

Pollards Confections, Ltd. (563812.) 112, Queen Street, Newton Abbot, Devon. Mfrs. of and dealers in confectionery, chocolates, ices, cooked and prepared food, etc. £10,000. Dirs.: Ellen C. Pollard.

Salters Silicone (Bakery Supplies), Ltd. (566787.) 39, Salisbury Road, Cardiff. £100. Dirs.: C. W. H., Mrs. S. K., H. M. and Mrs. P. A. Salter.

S. Steinhart and Sons, Ltd. (563915.) 79, Commercial Street, London, E.1. Mfrs. of and dealers in chocolates, sweets, confectionery, ice cream, aerated waters, etc. £2,000. Dir.: S. Steinhart.

W. Sykes and Sons, Ltd. (562285.) 38, Potovens Lane, Lefthouse Gate, nr. Wakefield, Yorks. Bakers, pastrycooks, flour millers, etc. £2,000. Dirs.: W., P. and B. Sykes.

Tarver and Sidwell (Frozen Foods), Ltd. (567292.) 11/13, Waterloo Place, Leamington Spa. £10,000. Dirs.: E. and A. J. Sidwell and L. S. Toone.

Topcliffe Bakery (Mosley), Ltd. (565910.) Topcliffe Lane, Morley, Yorks. £1,000. Dirs.: Ivy Armstrong and C. A. J. Linney.

Weldon Laing and Sons, Ltd. (566397.) Importers and sellers of meat; butchers, etc. £1,000. Dirs.: W. Laing, Bothal Villa, Ashington; G. H., R. T. and Hilda Laing.

B. L. Wood, Ltd. (564620.) To acquire all the goodwill, equipment, and stock in trade of the business of ham canners and fresh ham cookers carried on at Water Lane, Maidstone, Kent, as "B. L. Wood." £10,000. Dirs.: G. W. Jenkins and A. W. Turnill.

Wye Valley Foods, Ltd. (562424.) 27, Widemarsh Street, Hereford. Mfrs., packers and dealers in canned, frozen, preserved foods of all kinds. £100. Dirs.: J. C. Cadbury, G. C. Webster, F. O. Brann and R. Pollak.

From Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C.2.

New Scottish Companies

K. S. Dobie and Son, Ltd. Loreburn Street, Dumfries. £35,000. To acquire and carry on the business of grain merchants, provender millers and compounders carried on at Dumfries under the firm name of K. S. Dobie and Son. Dirs.: K. L. and Mrs. Dulcie, F. Dobie, and Andrew Muir.

Hastie and Co. (Edinburgh), Ltd. £8,000. To acquire and carry on the business of Hastie and Co, 14-16, Holyrood Road, Edinburgh, for the manufacture and sale of bakery utensils and general equipment for the food manufacturing trades, etc. Dirs.: Ronald F. W. Hastie, Mrs. Jane F. McLaren (or Hastie), and Ronald F. Hastie.

Lunar Products, Ltd. £1,500. Makers of and dealers in chocolate, cocoa, confectionery, biscuits, cakes, pastries, etc. Dirs.: Francis Moon, 4, Honeybog Road, Glasgow; James Moon and James M. Downie.

Monkland Supplies, Ltd. £100. Wholesale and retail suppliers of meat, offal, groceries and other foodstuffs, chemicals, fertilisers, etc. Subs.: Francis Ferguson, 133, Leven Road, Coatbridge, and Walter A. Goodman.

Munros' (Bakers), Ltd. 7, West Pilton Rise, Edinburgh. £1,000. To take over and carry on the business of bakers, confectioners, dairymen, etc. Dirs.: Alexander and Carolina R. Munro.

North Sea Fish (Granton), Ltd. £5,000. Preserved provision manufacturers, fish curers, salesmen, etc. Subs.: Elizabeth D. Brodie, 51, Middleton Road, Uphall, and M. C. S. Kerr.

William Hodge (Wines and Groceries), Ltd. 2, Church Street, Dumbarton. £5,000. Exporters and importers, wholesale and retail grocers and provision merchants, etc. Dirs.: Thos. R. and Mary Hodge.

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AROMALT.—749,556. Bread, biscuits (other than biscuits for animals), cakes, flour and cereal preparations for food for human consumption, all containing malt. **Montgomerie and Co., Ltd.,** 174, West George Street, Glasgow.

AROMALT.—749,557. Malt and malt extract; and foodstuffs for animals containing malt. **Montgomerie and Co., Ltd.,** 174, West George Street, Glasgow.

ELIZABETH ANN.—750,100. Fruit peel; and preserved and dried fruits. **Norman L. Waggoner, Ltd.,** 37, Eastcheap, London, E.C.3.

EXINA.—749,291. Mandarins, crab, salmon and prawns, all being canned. **Bethell Brothers, Ltd.,** 87-89, Paul Street, London, E.C.2.

FLUFFO.—750,141. Edible oils and edible fats. **Thomas Hedley and Co., Ltd.,** Phœnix Buildings, Collingwood Street, Newcastle-on-Tyne.

GLORO.—749,668. Edible oils and edible fats. **Thomas Hedley and Co., Ltd.,** Phœnix Buildings, Collingwood Street, Newcastle-on-Tyne.

GREAT SCOT.—B749,250. Butter manufactured in Scotland and for sale in Northern Ireland. **Skerrybahn Dairies, Ltd.,** 45-53, Trafalgar Street, Belfast.

HOMUL.—748,927. Emulsions, consisting principally of sugar, for use in baking. **James Bower Cosh,** 527, Springburn Road, Glasgow, N.1.

JUSODA.—748,061. Carbonated mineral water drinks included in Class 32. **Tizer, Ltd.,** Hollinwood Avenue, New Moston, Manchester, 10.

LADYFARE.—748,556. Jams, jellies (for food); and preserved, dried and cooked fruits and vegetables. **The Birmingham Chemical Co., Ltd.,** "Wiltell" Works, St. John Street, Lichfield, Staffs.

OLINDO.—749,914. Meat; fish, poultry and game (none being live); meat products, fish products, poultry products and game products (all for food); fruits and vegetables, all being preserved, dried, cooked, bottled or canned; and edible oils and edible fats. **Plantin Brothers, Ltd.,** 6, Laurence Pountney Hill, London, E.C.4.

PUREXA.—749,426. Edible oils and edible fats. **Thomas Hedley and Co., Ltd.,** Phœnix Buildings, Collingwood Street, Newcastle-on-Tyne.

REN.—734,182. Ground almonds and preparations consisting principally of ground almonds, and granulated white of eggs all for use in the bakery and confectionery trades. **John F. Renshaw and Co., Ltd.,** Locks Lane, Mitcham, Surrey.

ROSAMIN-C.—747,406. Syrups and preparations for making beverages included in Class 32, all being goods containing vitamin C. **Lamb Bros. (Dublin), Ltd.,** Naas Road, Dublin, and c/o Sir Joseph Causton and Sons, Ltd., Sardinia House, Sardinia Street, London, W.C.2.

SINGEL.—749,958. Canned fruit and dried fruit. **Keerdijk Producten Maatschappij C.V.,** Singel 68, Amsterdam, Netherlands, and c/o McKenna and Co., 12, Whitehall, London, S.W.1.

SUNCAWT.—750,502. Tea, coffee and cocoa. **Whitehead Bros. (Manchester), Ltd.,** 18-20, Fennel Street, Manchester, 4.

WINKIES.—740,713. Chocolate, chocolates and non-medicated sugar confectionery. **Clarnico, Ltd.,** The Confectionery Works, Waterden Road, London, E.15.

Information and Advice

This Service is available to subscribers to FOOD MANUFACTURE. If a stamped addressed envelope is enclosed replies will be sent by post, but enquiries cannot be answered by telephone.

Mussel bottling

B.7912. *Could you please let us have a recipe for bottling mussels in small jars?* (Bristol)

After thoroughly cleaning and sorting the mussels, separate the meat from the shells and the "beards." Wash the meats and soak for about 1½ to 3 hr. in a 3% brine solution. After draining, soak for about 3 days in a 3% solution of distilled vinegar, to which about 2% by weight of salt has been added. Drain the pickled mussels and pack in glass jars, to which a spiced vinegar sauce may be added, consisting of vinegar, bay leaves, white pepper, cloves, mustard seed, fennel and paprika, etc. Close the jars and process for about 25 to 30 min. at 221°F.

Nitrites in meat

B.7809. *We are contemplating adding sodium nitrite to a pie meat seasoning for tinting purposes. Would a solution of 1 oz., which is the maximum that can be introduced to 150 lb. of seasoning, poured into salt, etc., in a mixer still retain its tinting properties?* (Aycliffe, Darlington)

Nitrite can be added to the meat during the chopping or other processing with as good an effect as pre-curing. Nitrites are incompatible with oxidising agents and are best not mixed with such things as spices except just before incorporation in the batch. It is best to introduce nitrites as a solution in water, as dilute as possible consistent with the amount of water available for adding to the batch, and incorporation should be very thorough.

Use great care in adding nitrite to meat that has already been cured by the long cure or nitrate method or a possible illegal excess may occur.

Desiccated coconut

B.7812. *Please supply information on the production of desiccated coconut.* (Beira, Portugal)

The most important points to observe are:

(1) Care in the selection of nuts; (2) prompt immersion of the pared nuts in abundant clean running water; (3) minimum of delay between removing nuts from tank and introduction into dryer; (4) temperature in dryer not less than 180°F.; (5) cooling to correct temperature before packing; (6) speedy packing, with exclusion of light, gases and moisture.

Use only ripe, unblemished nuts and do not remove shells until a few days before use. Place pared nuts in a concrete tank supplied with constant running water. Cut to correct size and shape for the slicer machine and carry on the latter in wicker baskets from which the water can run quickly. See that the knives of the slicer are sharp and allow the sliced nuts to fall into wooden or iron boxes from which the water can run away at the bottom. Dry for 45 min. at a temperature of about 180°F., using trays about 3 ft. 6 in. sq. by 2½ in., with galvanised wire mesh bottoms, and holding about 20 to 25 lb. of material. Spread the dried material on to wooden tables for cooking and inspection before being sifted and packed. Reduce moisture content to 2%, and pack (using a press if possible) in seamless plywood boxes with paper, aluminium or lead linings.

Information supplied

The Enquiry Service has dealt with requests for names of manufacturers and suppliers of plant, machinery and materials, and also general information as follows:

B.7812. *Dried coconut.* (Beira, Portugal)

B.7815. *Flavouring soft drinks.* (Huddersfield)

B.7816. *Use of soya bean in meat and canned products.* (Antwerp, Holland)

B.7817. *Manufacturers of cooking oils.* (Oldham)

B.7819. *Canning tripe and onions.* (Dublin)

B.7820. *Advice on storing potato crisps.* (Scunthorpe)

B.7822. *Suppliers of meat rolling machine.* (Kettering)

B.7823. *Suppliers of blackcurrant strigger.* (Maidenhead)

B.7825. *Address for applying for Government contracts for dried vegetables.* (Selby)

B.7826. *Suppliers of adhesive for sticking labels to film bags.* (Sandiacre)

B.7827. *Suppliers of horse-radish root.* (London, W.8)

B.7828. *Manufacturers of plastic containers for a bakery.* (Inverness)

B.7829. *Method for making malt hygroscopic.* (Laorghis, Eire)

B.7831. *Canning of tomato juice.* (London, E.C.2)

B.7832. *Manufacture of French mustard.* (Groningen, Holland)

B.7833. *Manufacture of cheese-flavoured popcorn.* (London, S.W.1)

B.7834. *Information and formulæ for making imitation cream.* (London, E.1)

B.7836. *Suppliers of rice paper.* (Wirral, Cheshire)

B.7837. *Packaging of roasted peanuts in bags.* (Colombo)

B.7838. *Suppliers of edible white fish meal and details of composition.* (Nantwich)

B.7839. *Suppliers of fruit dicing machine.* (Sydney, Australia)

B.7840. *Recipe for pork pie.* (Gibraltar)

B.7842. *Manufacturers and suppliers of wooden drums to pack Turkish delight.* (Battle, Sussex)

B.7843. *Manufacturers of sodium diacetate, for mould inhibition in bread.* (Manchester)

B.7849. *Makers of extractors for degreasing meat and bone meal.* (Waterford, Ireland)

B.7850. *Suppliers of broad bean pudding machines.* (Falkirk, Scotland)

Recent Patents

COMPLETE SPECIFICATIONS ACCEPTED

752,478. K. C. S. Aasted: Method of manufacturing hollow chocolate objects and a mould for them.
752,680. W. Bohm and H. Bohm: Preserving milk.
752,399. Cope, Whelon and Co., Ltd.: Egg-counting devices.
752,502. A. Handtmann: Apportioning machines for paste-like substances, particularly sausage fillings.
752,729. General Electric Co.: Food mixers.
752,650. Package Machinery Co.: Carton collapsing machine.
753,594. Watney, Combe, Reid and Co., Ltd., and E. C. Turner: Crates for containing bottles.
753,600. Instant Milk Co.: Dried milk product and method of making same.
753,613. Minister of National Defence of Canada: Process for the hydrolysis of proteins.
753,614. Chromoworks, Ltd., and A. J. Osborn: Cartons for packing tins or like containers.
753,717. O. J. Brunn: Laminated aluminium foil packaging material for butter, margarine and other edible fats and method of producing same.

ABSTRACTS OF BRITISH PATENTS

Cheese product

A cheese product is obtained by injecting veins of green mould into a cheese melt so as to provide clearly distinguishable green veins in the solidified product. —748,161. *Latterie Industriali Riunite "Lir" Robbio.*

Haulm-cutting machine

A frame is provided with a skid(s) and a disc(s) which rotates about an axis parallel with the direction of motion and carries cutter chains, etc., which co-operate with a ledger blade.—748,573. *W. M. Henderson.*

Food smoking cabinet

A joint between the walls, etc., of a cabinet comprises metallic external and internal plates clamped together and to the walls to define a hollow space. A resilient gasket is located between the inner plate and the inner wall surfaces, and the space is filled with loose insulating material.—744,723. *Atmos Corp.*

Dusting foodstuffs

A stream of air with entrained food dusting powder (preferably powdered starch) is directed towards the pieces of foodstuff, the air being collected near such pieces in the course of processing the same, and suction being applied to withdraw collected air with any excess powder. —746,101. *Craig Corp.*

Sausage linking machine

Connected links accumulate in a tubular container which is rotated on its axis during formation of the links, such container being movable relative to a co-acting, dividing and constricting device which forms the link sections, so as to separate the container and device while the former rotates for arranging the links in coils about its inner periphery.—746,118. *L. P. Cross.*

Bon-bon manufacture

Moulding occurs in temporarily closed cylindrical chambers between plungers which move axially therein; the plungers continue to hold the bon-bons after such moulding, subsequently releasing them on to a transporting chain which carries them to a packaging machine.—746,850. *F. Theegarten.*

Food processing machine

In a meat tenderiser, a pair of multiple-cutter rollers are journalled in a carrier frame supported by a bearing member of the machine frame, the carrier frame having two horizontal arms joined by a back portion, and one arm and the back portion being detachably secured to the bearing member.—745,125. *R. O. Dechert.*

Sugar-cane crusher

A feed roller has a surface for co-operation with a scraper, and an intermediate conveyor below such roller directs a flat layer of crushed cane into the bite of the crusher rolls.—747,600. *Braunschweigische Maschinenbaustalt.*

Cheese packaging during curing

Cheese is packed during curing by wrapping in a plastic wrapper in known manner, covering with a board material, a central panel of which covers one face of the cheese block, passing over this panel a sleeve of relatively rigid material with sleeve flaps which fold to cover the other face, and applying pressure on the block in a direction perpendicular to the central panel.—747,952. *Kraft Foods Co.*

Bottle labelling machine

In a machine of the kind incorporating an intermittent label conveyor comprising laterally spaced endless belts, etc., between which the bottles pass to take up gummed labels, smearing of the bottles with gum is prevented by providing pivotal screens opposite each belt, on the side remote from the label taken up, to prevent contact between the belt edges and the bottles.—747,955. *N.V., Maschinenfabrik Voorheen Jansen and Sutorius.*

Carton for fruit, etc.

A two-part carton comprises a folded-up blank which provides a base, side-walls, and a hinge lid with a tucking flap, and a second blank which folds up to embrace the side walls of the first blank and is secured by passing its ends through an aperture in one such wall.—748,003. *Herzberg Mullne Automatic Products, Ltd.*

Animal fat recovery

Fat is recovered from animal fat-containing portions by separating these portions and hashing them while still containing the natural animal heat and then subjecting them to high frequency vibrations to crack the cellular envelopes containing the fat globules, the temperature during this step being controlled so as to maintain the released fat substantially in liquid form and below the coagulation point of the proteins therein.—748,814. *S.A., Frigorifico Anglo.*

Planting machine

A seedling planter has furrow openers, presser wheels for closing the furrows, and a striker mechanism driven by such wheels which actuates a water-supply control valve only during forward motion of the machine.—749,581. *A. C. Nicholson et al.*

Yoghourt manufacture

Insulation for a wall(s) of a device for preparing fermented milk products is obtained by a constant-thickness layer of air which is heated.—748,483. *P. R. M. Savary.*

Groundnut harvester

The surfaces of laterally-opposed stripping members have outwardly extending bars and are relatively rotatable about mutually inclined axes, their spacing being such as to allow fruit to enter between while the plant is held by a gripper. —748,547. *National Research Development Corp.*

Slaughtering treatment

The bodies of fowl and other animals are treated with an aqueous mixture of Ca acetate, $CaCo_3$ and NaCl. This treatment is particularly useful in conjunction with the wet-plucking process.—748,617. *A. B. Kiposan.*

Vitaminised confectionery

The vitamins contained in yeast are incorporated in sweets by making a core of heat-processed sugar, liquid glucose, dried yeast and water and enveloping this with an outer covering of heat and vacuum-processed sugar, liquid glucose, water and flavouring essence.—748,619. *K.C.P., Ltd.*

Potato-harvesting reel

Multiple series of peripherally spaced and axially extending prongs are mounted on a fore-and-aft hub, and a device adjacent each series and rotating therewith raises and holds the contents of a drill being harvested before such contents are engaged by the adjacent prongs.—748,758. *A. G. Bonella.*

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Rainmaker extraordinary

THE ORINOCO INDIANS thought frogs had the power to make rain. As protection against drought they kept frogs captive. Then, if it got too dry, the captives were paraded and given a gentle beating; the idea was to make them croak and so bring on a shower.

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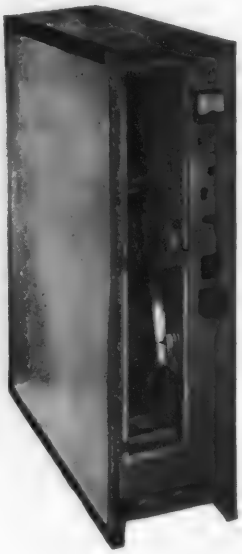

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A. E. Haarer, F.L.S., Dip. Hort., R.H.S.

The aim of this book is to supply the planter, the student and the field extension officer with an informative and interesting treatise in simple language. The author has endeavoured to say nothing that has not proved sound in practice or been based on the results of reliable research.

If the book has a strong East African flavour, it is not alone because the author has had his practical experience there, but because methods of cultivating coffee in East Africa are now of the highest order and are seldom equalled elsewhere. There are numerous line drawings and over a hundred photographs, some of which were taken by the author himself.

Starting with the early history of coffee, Mr. Haarer discusses at length all aspects of coffee production. There is detailed information on cytology, genetics, environment, shade, lining and holing, pruning, care and maintenance, harvesting, diseases, pests, etc., and a chapter devoted to the economic aspects. In addition, production in Africa, Asia and the Antipodes, and the Western Hemisphere is dealt with in greater detail in separate chapters.

The author's experience began at the age of twenty when he was appointed manager of coffee estates in Uganda. He was directly connected with the formation of the Kilimanjaro Native Planters' Association, now the K.N.C.U. In connection with his botanical collecting work for Kew and the British Museum he was elected a Fellow of the Linnean Society in 1928, and later, in 1930, he took charge of an Agricultural Training School. He now contributes to many journals at home and overseas, and has written several books on fibres.

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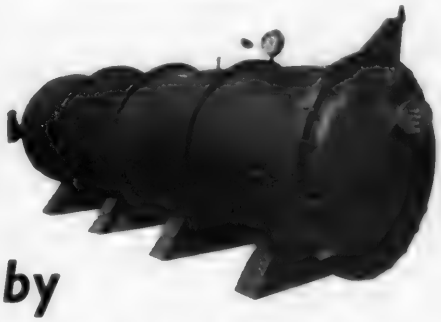

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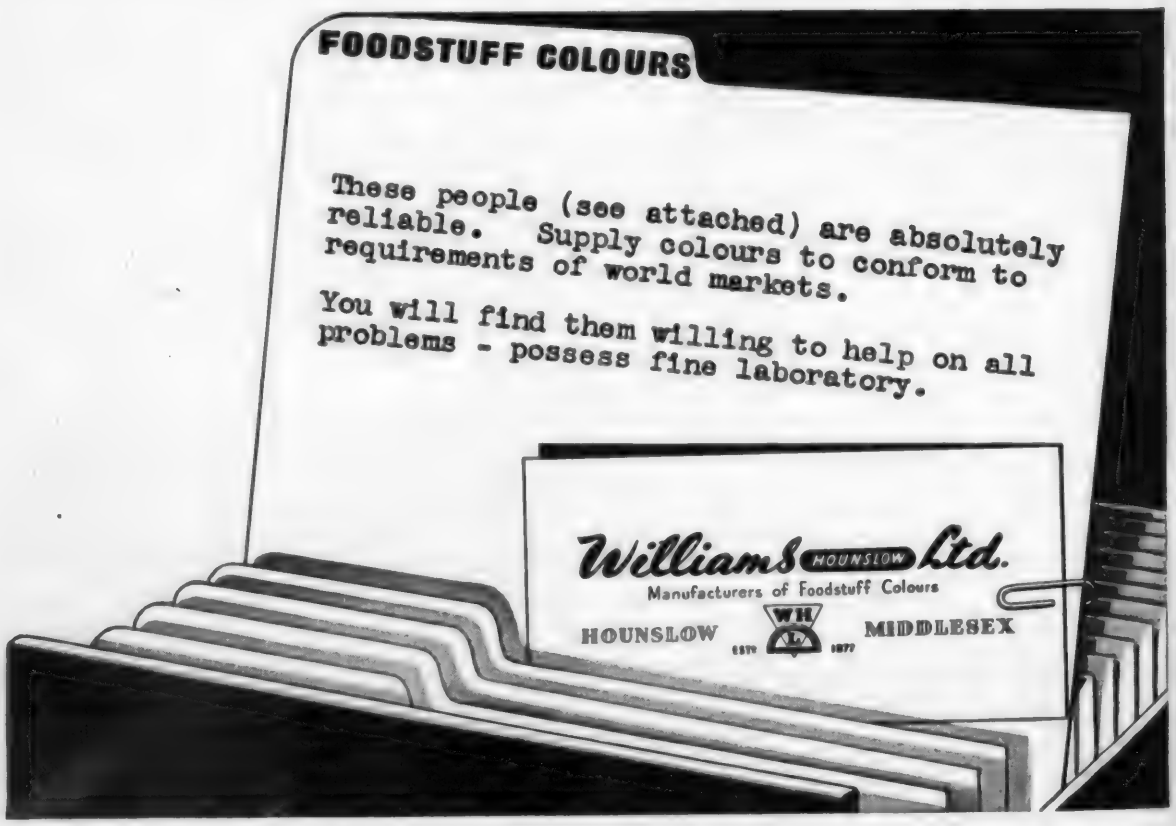
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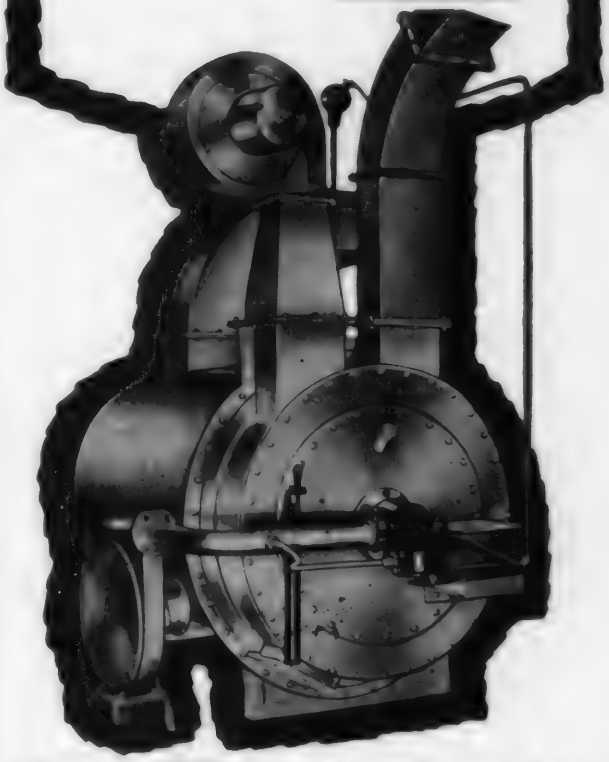

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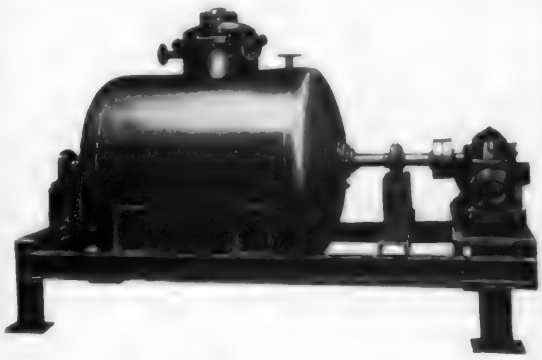

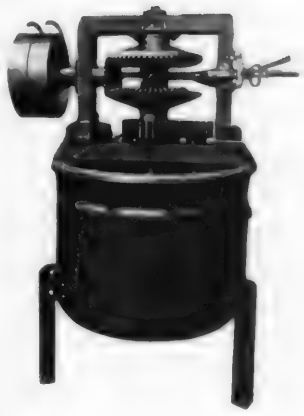

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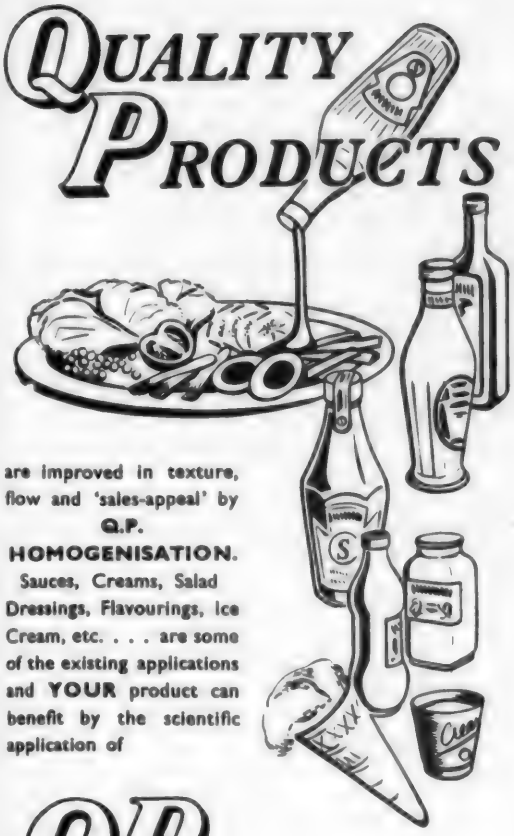

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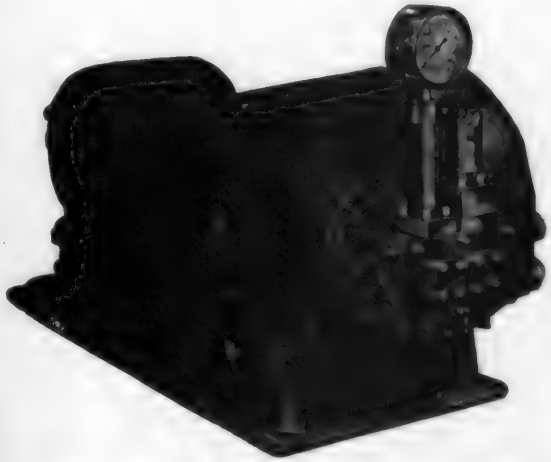

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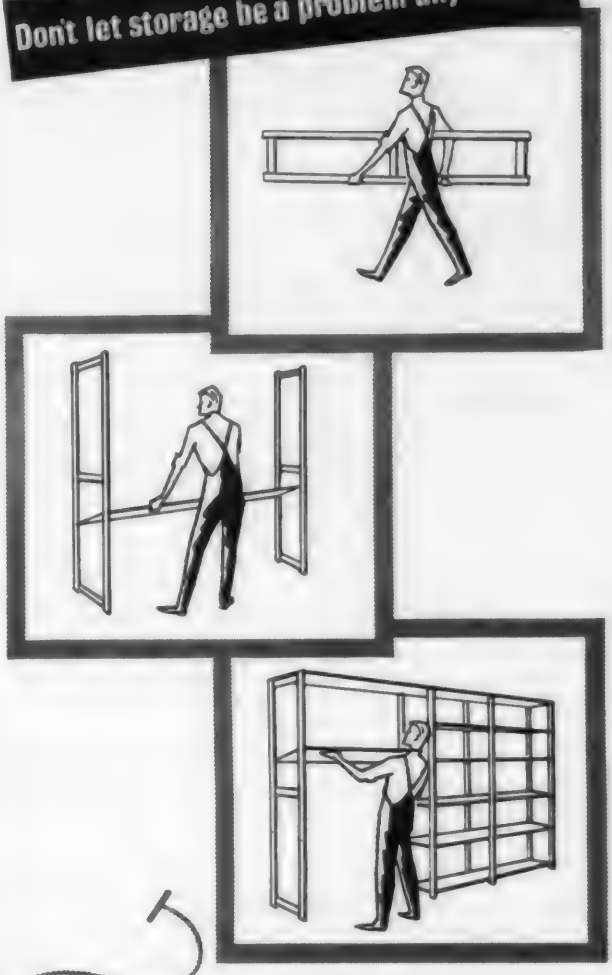

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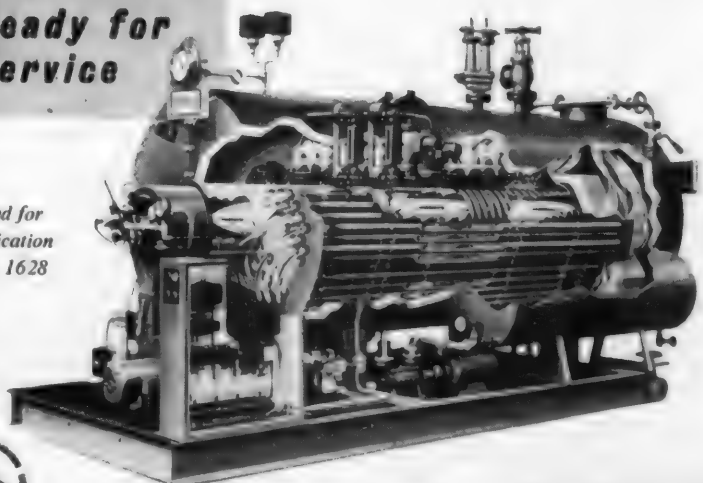

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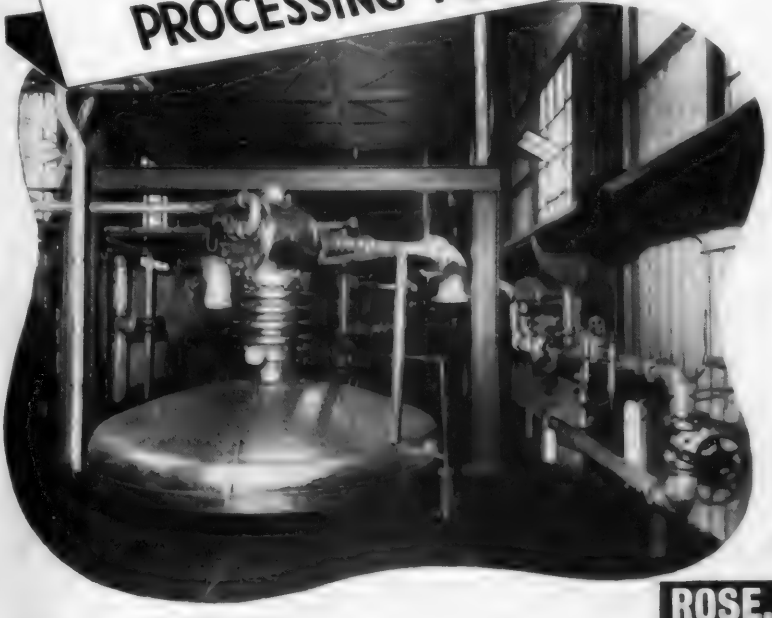

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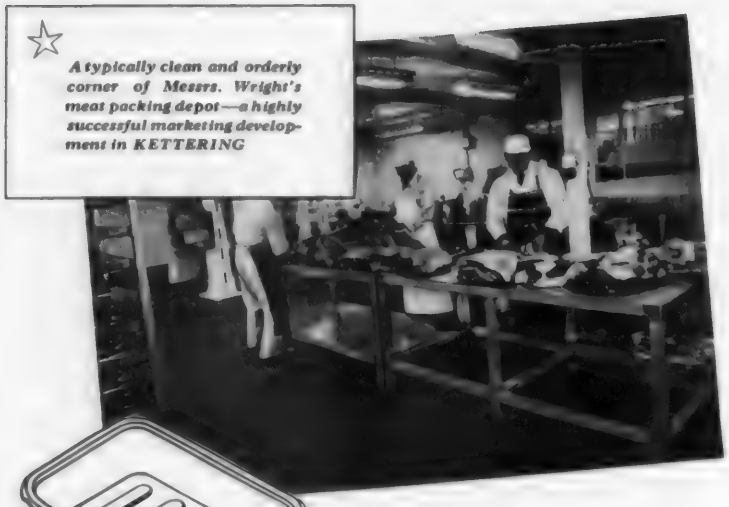

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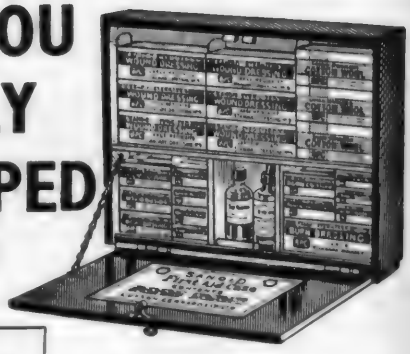

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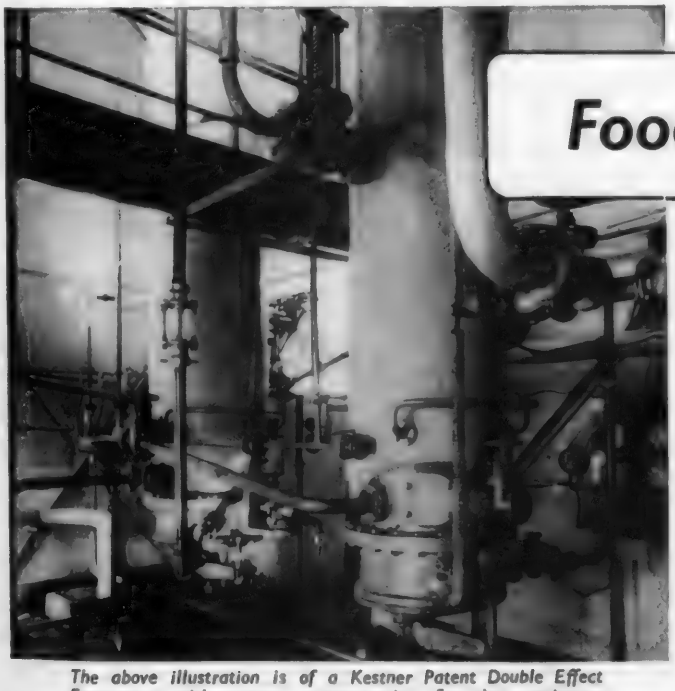

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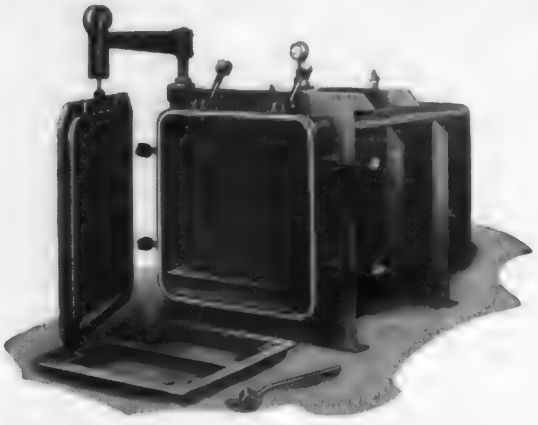

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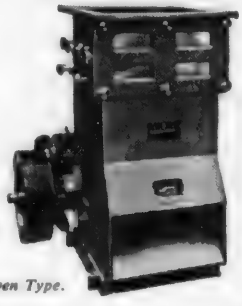

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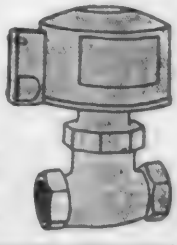

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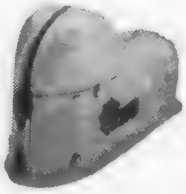

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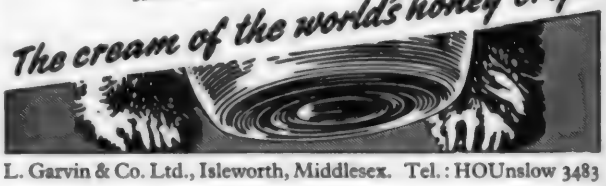

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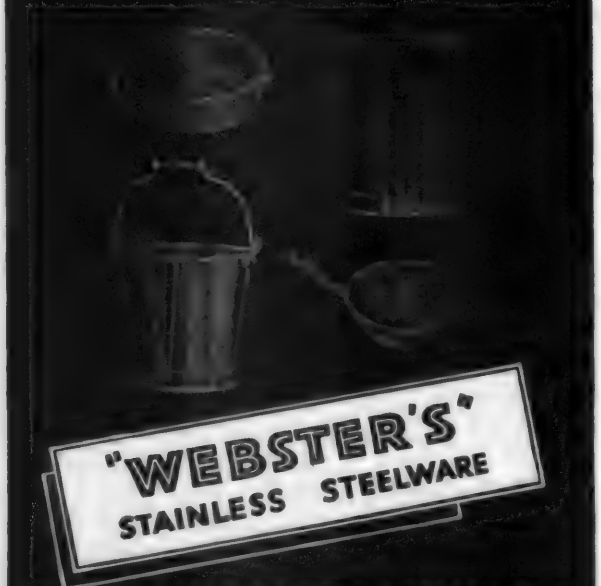

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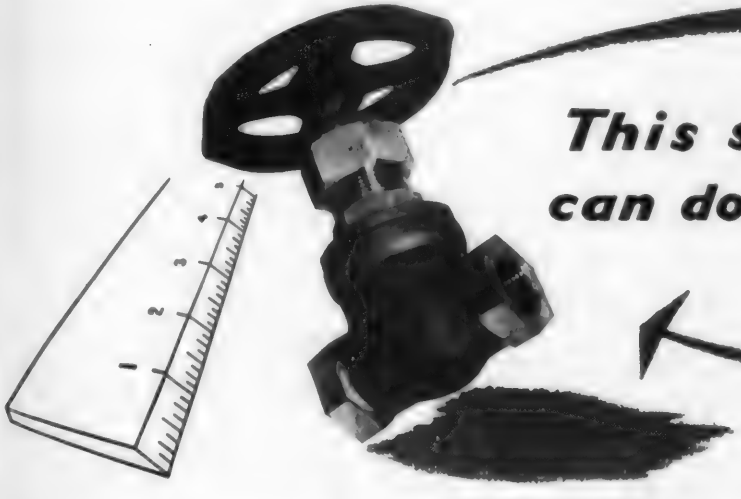

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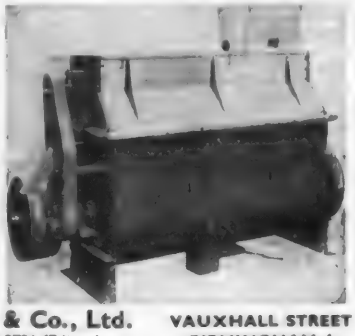

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Vertical Cake Mixer by Crypto, 40-qt. capacity, three-speed, with dough hook, whisk, beater and mincing attachments. Motorised 230/250/1/50. M.S. bowl 16 in. diam. by 14½ in. deep, hand-wheel operated rise and fall gear.

Vertical Change-pan Mixer by Hobart, 30-qt. capacity, three-speed, with cut-out. Sun-and-planet motion agitator with alloy flat beater and one tinned bowl, 14 in. diam. by 13 in. deep. Bowl raised and lowered. Motorised 400/3/50 through encl. gears.

Rectangular stainless steel Vessel, 6 ft. 6 in. long by 36 in. by 30 in. welded constr. approx. 18G., 1¾ in. flanged top, 1½ in. diam. bottom flange outlet.

80-gal. stainless steel steam-jacketed Boiling Pan by Groen Mfg. Co. of U.S.A., 32 in. diam, by 29 in. deep, hemispherical bottom, jacketed in this portion only. Bottom run-off fitted plug cock and hinged lid. Jacket suitable 40 lb./sq. in. w.p., fitted release valve and cock.

Four 40-gal. open top steam-jacketed copper Boiling Pans by Brierley, Collier and Hartley, 25 in. diam. by 18 in. deep including hemispherical bottom. Top edge wired incorporating pouring lip. Hand tilting. Cast iron jacket for 60 lb./sq. in. w.p. Mounted in stand.

Unused jacketed copper hemispherical Boiling Pan by Brierley, Collier and Hartley, 21 in. diam. by 15 in. deep, contra-rotating bronze scraper-type agitators driven by f. and l. pulleys. Screwed steam connections and glanded trunnion bearings. Hand-wheel tilting. Mounted on cast iron frame. Pouring spout. Jacket suitable for 30 lb./sq. in. w.p.

(*continued in next column*)

Walmar Mark V Chocolate Enrober by Walter Denis-Contacts. Water-jacketed chocolate bath fitted immersion heater and thermostat, 6 in. wide chain-type conveyor in coating section, air operated rippler, cooling section approx. 56 in. long mounted over 6 ft. centres, flat belt conveyor fitted 6 in. wide canvas belt covered food grade rubber. Cooling supplied by self-contained refrigeration unit; complete with A.C. motors.

Jelly Cutter by Brierley, Collier and Hartley, table 19¾ in. by 19¾ in. deep, adjustable daylight at present 1.1¾ in., 48 sections forming slabs 3¼ in. by 2¼ in. F. and L. pulley drive.

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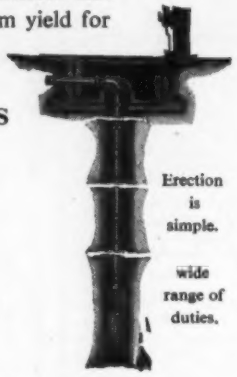

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